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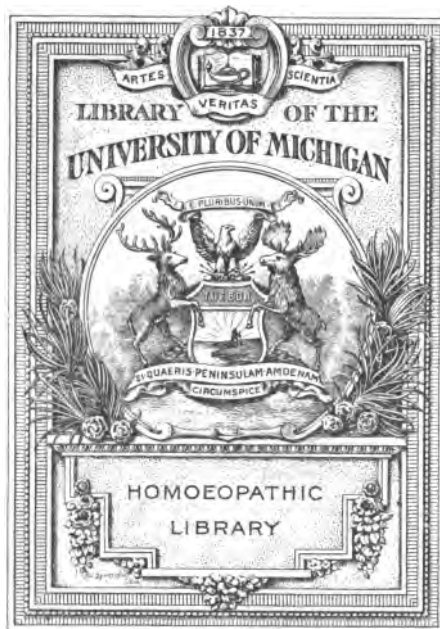
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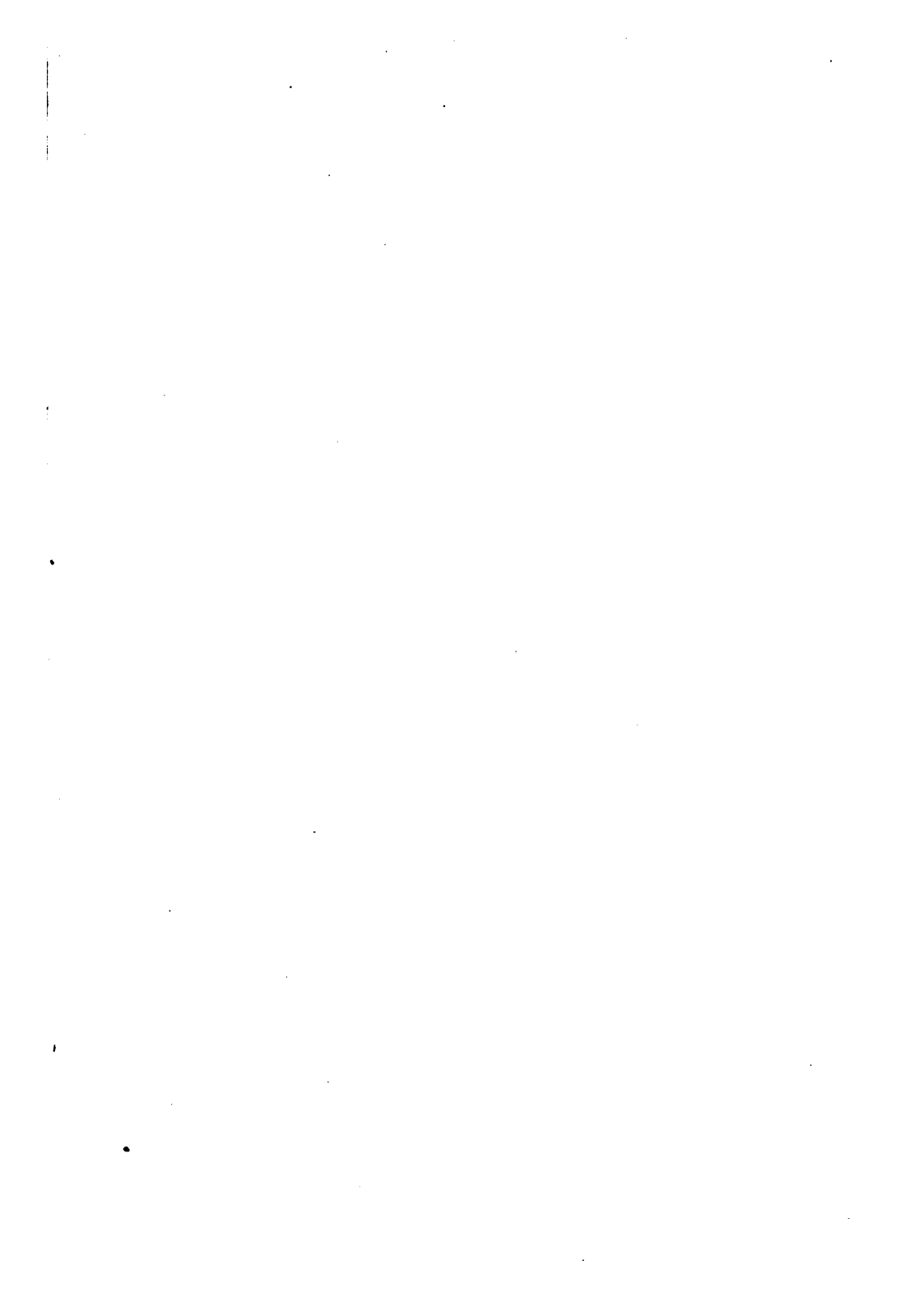
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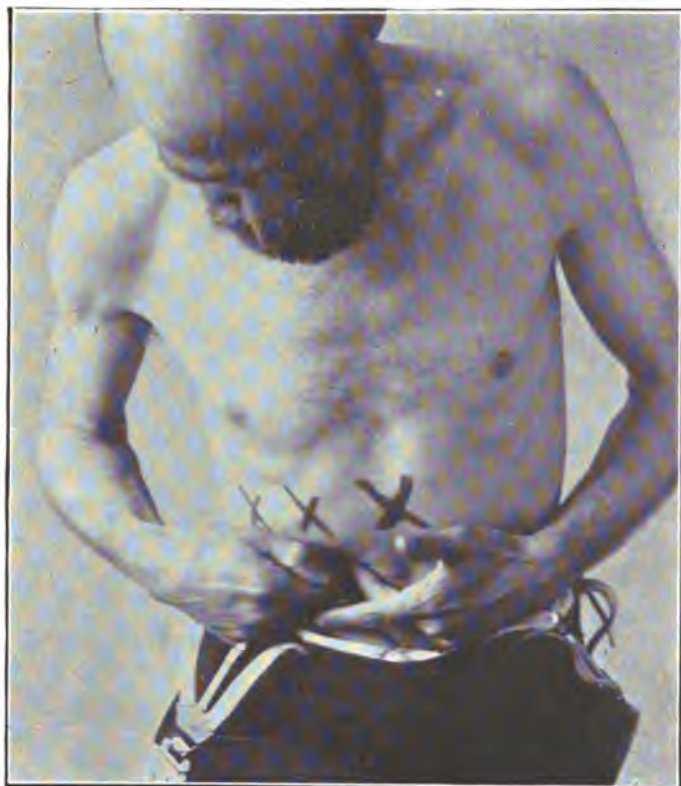


Fig. 8.—Method of executing auto-liver massage. See page 180.

# MAN AND HIS POISONS

A PRACTICAL EXPOSITION OF THE  
CAUSES, SYMPTOMS AND TREAT-  
MENT OF SELF-POISONING

BY

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## PREFACE

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The subject of self-poisoning has advanced from a plausible and fascinating theory to a verity. Although there is much concerning the subject about which we know little, and are not always sure of that, yet intestinal self-poisoning is sufficiently understood to furnish adequate data for its successful treatment. To one conversant with the subject, the contention of Bouchard is apposite—that man is constantly standing, as it were, on the brink of a precipice and continually on the threshold of disease. The human body is a receptacle and laboratory of poisons, and every moment of his life man is exposed to the danger of being overpowered by poisons generated within his system. Many bizarre and protean diseases owe their origin to self-poisoning, but so alluring has been the germ theory of disease that it has annihilated any initiative seeking the causation of disease from any other source. Nervous and mental diseases are often dependent on poisoning from the alimentary canal, and while such evidence is not always corroborated scientifically, the beneficial effects resulting from treatment based on this theory are sufficiently convincing. Many neurasthenics fully appreciate the observation of Hugo, “It is nothing to die; but it is frightful not to live.” The sufferings of a neurasthenic are best portrayed by defining hell as a place where immortality is conferred

on the nervous system. The tale of a neurasthenic reads like a patent medicine advertisement.

The symptoms of self-poisoning are mainly objective, and for this reason are overlooked by the patient and disregarded by the physician. The author has endeavored to present in clear terms and in concise form the fundamental principles of the subject, and has therefore eliminated subject-matter of more interest to the theoretician than the practitioner. Special attention has been directed to the action of the sinusoidal current to show that its effects are dissociated with suggestion. Repeated reference is made to the principles of psychotherapy, for the mind is an important factor in influencing the body for weal or woe. The indifference of physicians concerning psychotherapy has called into existence many pseudo mind-cures. Dr. de Fleury in "Mind and Medicine" says, "In neglecting the systematic and scientific employment of mental influence in the course of disease, medical practitioners throw aside a weapon for combating it more powerful than all the drugs in the pharmacopœia." To eschew a remedy because we cannot gauge its material properties may be an act worthy of the scientist, but the aim of the physician is to cure his patient by legitimate means, however unscientific. It is the attitude of the scientist which makes it possible for the quack to thrive. I am indebted to Dr. Fred Joyce for his valuable assistance in experimental investigation.

ALBERT ABRAMS.

SAN FRANCISCO,  
*November, 1905.*

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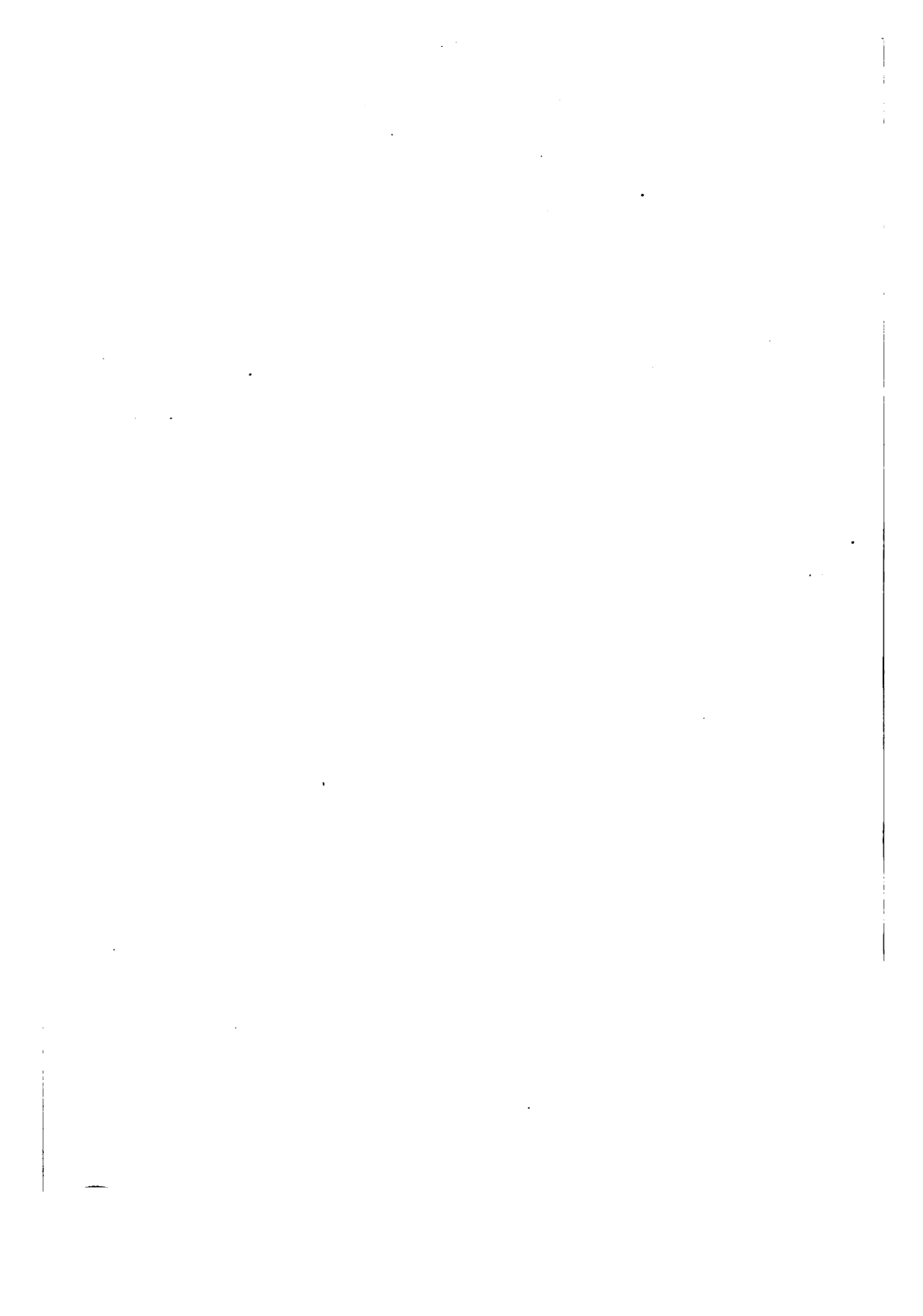
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# Man and His Poisons

## I

### LIFE

ORTHODOX AND SCIENTIFIC CONCEPTION OF LIFE.—  
CHEMISTRY OF LIFE.—INVESTIGATIONS OF LOEB.  
ANIMAL MACHINE.—THE N-RAYS.—THE PHYSICS  
OF LIFE.—NERVE FORCE AND ELECTRICITY.—  
VIBRATION AND LIFE.—MAN AS AN AUTOMATON.  
—ESSENTIAL ELEMENTS OF LIFE

*Orthodox and Scientific Conception of Life.*—When in the Middle Ages it was believed by the theologians that there existed in man an imponderable, incorruptible and incombustible bone which was the necessary nucleus of the resurrection body, Vesalius, the anatomist, discreetly left the question respecting the existence of such a bone to the theologians. Since the time of Vesalius science has divorced itself from crude beliefs which have no adequate reason for their existence other than the authority of tradition. With metaphysics and religion one is able to achieve any grade of specious reasoning. One may speculate and dogmatize with metaphysics, but science invariably investigates. Science has dissociated itself with speculative philosophy and progresses along the lines of

sense impressions. Science never transcends human intelligence, nor does it invoke in the interests of its doctrines any suspension of nature's laws; for, after all, "facts are the words of God." With the cherished theories of to-day, science often officiates at their burial on the morrow. Thus does science express its eclectic methods. We should suffer no more restriction in the study of biology than any other science. The religionist denies that science offers consolation to the soul. Applied to the ignorant, this contention is correct. The educated cannot reconcile doctrines in conflict with progressive science. The doctrine of *immortality*, supported by religion and denied by science, is by no means alluring. Annihilation of self is, according to the religion of Buddha, perfect rest, and is not to be feared when old age has come with its inevitable assemblage of infirmities. Haeckel relates the legend of the unhappy Ahasuerus, who vainly sought death after finding his eternal life intolerable. No one can deny that the theologian often subserves the biological function of increasing the birth rate by suppressing abortion and divorce and decreasing mortality by inhibiting vice. True, religion and science should be so harmoniously blended that Christian Science and other delusions could have no hold even on this neurotic age. The neurotic is a susceptible creature of suggestion, and when you can offer him a panacea for disease together with spiritual comfort consistent with his childhood's belief, he fervently embraces such a doctrine despite the fulminations of the scientist and theologian.

The object of *modern psychology* is to formulate laws respecting operations of the mind. The older methods of psychological research were introspective, and related to the observations of the psychologist on his own mind. He concluded that such observations which were true in relation to himself were equally applicable to others. Modern experimental, with instruments of precision, has succeeded introspective psychology. The old or metaphysical psychology ignored the soul; the new or physiological psychology regards the nervous system as the bridge between mind and matter. Psychology, however, cannot adduce laws as do the sciences.

The orthodox doctrine of the soul supported by spiritualistic philosophers is, that it possesses none of the properties of matter; that it is created simultaneously with the body and that it is capable of itself, independent of any other cause, of controlling the bodily functions. The physiologist regards life as a force active on and through matter. Living matter has a definite chemic composition wasting by oxidation and reintegrating by the assimilation of new matter. Living matter in its primary state is known as protoplasm. In the disintegration of the latter, waste products result. Thus all living proceeds from pre-existing living matter (*omne vivum e vivo*). Living matter thus propagated uninterruptedly is endowed with immortality.

*Life* is merely a chemic function. Life awaits a definition. No definition yet evolved portrays a clearer conception of life than the word life itself.

Spencer's definition that life is the continual adjustment of internal to external relations does not connect the phenomena with the structure of living matter. Life is so complex and vast that our conception of it cannot be reduced to a single phrase. The *theory of evolution* measured by our present methods still holds, viz., that the race or species develops in the same natural manner out of what has preceded it. The Dutch botanist, Hugo de Vries, in his recent studies of the evening primrose, demonstrated that a new species may come into existence in a single generation instead of the slow modification dependent on the selection of infinitely minute variations through countless generations. His *theory of mutation* does not supplant the law of evolution; on the contrary, it supports it, and merely shows that under certain conditions the evolution of species may be hastened.

Someone who evidently reflected his own distress defined man as a more or less dyspeptic animal surrounded by clothes. Another defined man as a form through which a stream of matter flows; and still another said, life is the result of responses to stimuli. A phenomenon declared to be characteristic of life was the power of *self-locomotion*; but it has since been shown that animals exist which never move. Scientists have classified animals and plants as living, and minerals as non-living; but this distinction has been questioned recently by Professor Bose of the Calcutta University. Bose regards as the true test of life in an object its capacity to respond to an external stimulus—



in other words, its irritability or sensitiveness. If the latter is a criterion of life, Bose notes no difference between animals and metals; in fact, iron is as irritable as the human body. The galvanometer measures current strength and shows an electric current by the deflections of the magnet. When the instrument is connected with a nerve and the latter is irritated the needle of the instrument will be deflected, showing that irritation will produce a current in the nerve not unlike that of electricity. Bose's revelations are based on the fact that if the galvanometer reveals sensitiveness of animal matter, it is equally applicable in testing metals. He proves by this method that metals are irritable; that they have periods of activity and rest, like animal matter; that they show curves of fatigue when stimulated excessively, and that stimulants and narcotics have an action on metals similar to that observed in living animal matter. Professor Robin has just reported to the Paris Academy of Medicine that certain metals, like gold and silver, finely subdivided by electrical dissociation in water, acquire the property of developing a force similar to that of a ferment, and that they may be successfully employed in the treatment of pneumonia by hypodermic injection in infinitesimal doses. We know that life is a force, and a force that employs other forces for inducing a series of definite and successive changes. If matter does exist as something apart from force, it is difficult to understand the absolute nature of the latter until we know what matter is. The discovery of radium has exploded old theories. We formerly

supposed that a substance was composed of atoms held together by a kind of cement like the bricks of a brick wall.

We now regard atoms as electric in character and that they are widely separated and flit about with astonishing speed and energy. In other words, the atom is now regarded as a body like our solar system, with an enormous number of planets and stars rotating around one another and united by an electric gravitation band. It appears for essential purposes that radium is alive, and the exact line where life begins and death ends remains, as before, unsolved. When Sir William Ramsay observed the transformation of radium into helium he made tenable even the discovery of the mythical "philosopher's stone." Warmth is no criterion of life. Some plants thrive at a temperature which would congeal animals. Fungi which grow upon the surface of the snow exist for all practical purposes without warmth.

One of the most recent astounding revelations emanating from an authentic source relates to the *transformation of dead into living matter*. Professor Burke of Cambridge, England, introduced into sterilized bouillon a little radium and noted that the previously germ free bouillon and radium soon contained elements which presented the microscopic characters of living protoplasm. He concluded that the activity of the radium shooting off electricity charged particles through the inorganic substance of the bouillon, and had in some manner brought about a union of chemic elements in the form of living matter.

*The Chemistry of Life.*—Oliver Wendell Holmes apperceived man chemically as follows:

“Nothing but a cloud of elements organic,  
C. O. H. N., Ferrum, Chlor., Flu., Sil.,

Potassa,  
Calc., Sod., Phos., Mag., Sulphur,  
Mang., (?) Alumin, (?) Cuprum, (?)  
Such as man is made of.”

The specific feature of living matter is its chemic mutability. The constituents of living matter are subject to constant change. “From hour to hour we ripe and ripe, from hour to hour we rot and rot, and thereby hangs a tale.”

The elements constituting living matter are being constantly replaced by like elements introduced with the food. Thus the chemistry of life is a history of food changes in the body plus the mechanisms by which its potential energy is converted into vital force.

*The Investigations of Loeb.*—Professor Jacques Loeb of the University of California has practically overthrown many so-called immutable scientific laws. While it was possible to effect the fertilization of eggs with the sperm of the same species, Loeb in his original experiments was able to cross the various species of the same family, and with his latest biological marvel he has succeeded in hybridizing the individuals of different zoölogical families, thus bringing about relationships and breeds that were once considered impossible. In achieving his results, he had to contend with many difficulties: A mechanical difficulty,

the entrance of a spermatozoön into the egg of a species belonging to a different family; second, the fact that the body fluids of one animal are in general poisonous for the cells of unrelated species. The latter chemic difficulty was obviated by making a slight change in the chemic constitution of the surrounding fluid. In normal sea water the fertilization of the sea urchin egg by the sperm of "Asterias" is only exceptional and occurs only in isolated eggs, the process being successful in Van Hoff's solution which has been made alkaline. In other words, Loeb has duplicated by means of chemical solutions the function of fertilization. Henceforth it will be possible to raise animals in which the hereditary characters of both parents have not been mixed.

Chemical decomposition by electricity is known as electrolysis, and the products as *ions*. Now Loeb has shown that any variation in the proportion and character of the electrolytes in a tissue is capable of imparting to that tissue certain properties. The chief electrolyte in our blood is sodium chloride. If a muscle is put into a solution of the latter (*i. e.*, isotonic with the muscle) it twitches rhythmically, while the addition of a soluble calcium salt prevents the twitchings. Loeb then concluded that we owe it to the calcium ions in the blood that our muscles do not twitch or beat rhythmically like our heart. This and other experiments seem to show that the phenomena in life are both chemical and physical. One of the fundamental objects of biology is to make living out of dead matter. Spontaneous generation is not recognized,

hence Arrhenius assumes the eternal existence of living matter carried through the universe from star to star as microscopically invisible particles like spores. Thirty years ago Lord Kelvin asserted that the first living cell on this planet was conveyed by a meteorite from the "moss-grown ruins of another world." This view merely shifts the responsibility of life's origin from this to another planet. Assuming that such a meteorite did come, in coming it would develop an elevation of temperature sufficient to annihilate germ life.

In the growth of animal or plant life there is a constant translation of dead into living matter. The phenomena of life are being constantly duplicated in the organic world, and can be modified by chemical or physical means. The chemist and physicist are only partially acquainted with the human mechanisms which regulate the temperature and concentration of the body fluids. Were this mechanism better known—for life depends on continuous adjustments—the creation of life from dead matter could be regarded as a possibility. In other words, such creation is made impossible by technical difficulties. The horticulturist has so manipulated life that the most beneficial effects have resulted to mankind. The capacity of living matter to transform inanimate food into living substance by the force known as *nutrition* is practically the dividing line between animate and inanimate matter. There are chemic reactions which, while taking place outside the body, do not take place within it; yet the contrary is also true. Within the body common salt is decom-

posed into an alkali, and hydrochloric acid and carbolic acid unite with the sulphuric acid of the body to form a non-poisonous combination. Biologists are constantly striving to discover the essential structure of living matter with the hope of conceiving life based upon a knowledge of the chemic composition of the substance through which it is revealed. The chemic theory of Pflüger suggests that the real difference between dead and living proteid lies in the grouping of the nitrogen in the molecule. In the dead proteid it exists as an ammonia compound; in the living proteid it occurs in the cyanogen grouping. Thus the sulphocyanides in saliva, milk and urine are but the overflow of the cyanogen radical common to all living proteid. Therefore, as Eccles comments, "the very foundations of our being are laid amid the most deadly of poisons. Certain vital phenomena have been reasonably associated with chemistry. The *Young-Helmholtz theory* conceives the retina to contain the primary colors, red, green and violet. Each color sensation is dependent on the chemic changes on the colors affected by the selective action of light rays of a definite wave-length. In color blindness one of the retinal colors is deficient. The chemic action of light is well known. Compounds of silver and organic matter are blackened and many colors fade on exposure to light. The green coloring matter of foliage is in part due to sunlight. Now the rods of the retina are supposed to contain a substance called *visual purple*, which bleaches when exposed to light and its color is restored in darkness. Vision, as is well known, always becomes more acute

after a temporary sojourn in a dark room. What the brain perceives as visual sensations are essentially chemic.

*The Animal Machine.*—The normal temperature of man is 98.6 F., whereas the temperature of the surrounding air in temperate climates is nearly always below this point; hence it is evident that the body must be continuously losing heat or energy. "Life," said Sir Thomas Browne, "is a pure flame, and we live by an invisible sun within us." Ostwald in studying the relations of biology and the neighboring sciences speaks of a benzine motor, which regulates its benzine supply by means of a ball governor in such a way that its velocity remains constant, as having exactly the same property as a living organism. If such a machine could work constantly and could receive an inexhaustible supply of benzine, we would be compelled to regard it as a living organism. The source of the body's energy is the food. The food of man consists of *proteids* (meats), *carbohydrates* (starches and sugars) and *fat*. All are essential to life. The proteids are made up of carbon, hydrogen, nitrogen, oxygen and a small amount of sulphur. The carbohydrates and fats contain only carbon, hydrogen and oxygen. These foodstuffs can combine with a further proportion of oxygen to form more stable compounds, and thus evolve a definite amount of energy, which is known as *potential energy*. When the foodstuffs oxidize or burn to form carbonic acid and water, they generate the potential energy in the animal body which is either expressed as heat or work.

The oxygen which we take into the lungs is necessary for the combustion of the foodstuffs. In this sense the body may be likened to a heat engine, the fuel or source of energy being the food. The lungs subserve the dual function of providing the inlet for the draught of air and the outlet for the waste gases. Like the coal employed in engines, which has incombustible elements and must be removed as ash, so it is with the unused food in our bodies—it must be removed as excrementitious matter in the fæces, urine and other excretions. Water and carbonic acid are eliminated by the lungs; the nitrogen of proteids united with carbon and oxygen in the body to form urea is excreted by the kidneys. The sulphur is oxidized to a sulphate and is also eliminated by the kidneys. Income and output of the body and income and output of energy may be equationally expressed:

$$\text{Food} + \text{oxygen} = \text{fæces} + \text{carbonic acid} + \\ \text{water} + \text{urea}.$$

The energy developed by the combustion of food to carbonic acid, water and urea equals the work done by the body plus the heat set free. The ingested food in the body undergoes changes quite unlike the fuel supplied to the heat engine. In the latter instance the fuel is something apart from the machinery by which its energy is transformed into work. One-fourth of the food-fuel passes into energy and three-fourths to the production of heat. The steam engine uses one-sixth of the energy of the fuel, while the remainder is wasted as heat.



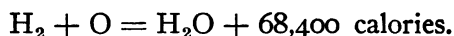
The ingested food before it is taken up by the living body must be digested and assimilated and the changes which it undergoes are divided into two stages:

First, the *assimilative* or anabolic changes, whereby the food absorbed from the alimentary canal and the oxygen taken into the lungs are destined for the building up of the body and become active constituents of the living protoplasmic molecule, replacing some unstable compound of the same molecule. The real source of energy of vital phenomena is brought about by the *dissimilative* or katabolic changes which disintegrate the protoplasmic molecule. *Katabolism* signifies the disintegration of the living molecule with the discharge of energy. To efficiently work the animal machine, the fuel represented by the food must be taken with discretion. Insufficient food will not run the machine and too much food predicates excessive expenditure of bodily energy.

*The Physics of Life.*—The origin of animal energy predicates an understanding of the *law of the conservation of energy*. Chemic action is demonstrated by different forms of energy; it may be heat, light or electricity. A chemic reaction is not only a rearrangement of matter, but also a transformation of energy. When coal is burned, not only is carbonic acid formed, but heat is likewise liberated. The *law of the conservation of energy* is: Energy, like matter, cannot be created or destroyed; it can only be transformed, and in the transformation there is neither loss nor gain. A definite quantity of heat is converted into a definite quantity of work, and the quantity of work may be

reconverted into the same quantity of heat. Every chemic change is associated with the absorption or liberation of heat. Heat is measured in calories—a calorie representing the amount of heat necessary to raise the temperature of one kilogram of water one degree Centigrade. A calorie expressed in energy is equivalent to the work necessary to raise 425 kilograms one meter in height.

A thermal equation like the following indicates that 68,400 calories of heat are liberated when 2 grams of hydrogen unite with 16 grams of oxygen to form 18 grams of water:



Heat evolution by chemic action is shown when lime and water are mixed, the heat resulting being sufficient to boil water. Evolution of light as a result of chemic action is demonstrated in many chemic experiments with oxygen. Combustion is manifested by light and heat.

*The N-Rays.*—In a chemism like the living body the observations of Charpentrier are understandable. Blondlot first discovered what he called the N-rays—in honor of the University of Nancy, with which he is connected.

The N-rays, first detected in an excited X-ray tube, have subsequently been observed in sunlight, electric, gas and other sources of illumination. Also in metals under severe molecular strain. The rays pass through aluminum, wood and saline watery solutions, but are arrested by water. Some substances accumulate or

store the rays. Rays similar to the N-rays are given out from the human body during muscular and nervous excitement and by compression of nerves. These rays are seen in relative or absolute darkness by means of a fluorescent screen. Increased mental effort is said to increase the fluorescence upon the excited screen. Charpentrier's observations have been confirmed by some and denied by others. The rays are said to be emitted by plants as an expression of nutritional activity. I may add that preceding the publications of Blondlot I used the sulphide of calcium (phosphorescent), not on a screen, but by mixing it with linseed oil and applying it directly to the chest of the patient. To make the paint luminous I exposed the painted part in a dark room to burning magnesium wire or to the light of a powerful incandescent lamp. Two years ago I abandoned my investigations. The glare of the phosphorescent light made my vision so untrustworthy that I could almost see what I wanted to see. Painting indifferent objects yielded the same results as the human body.

Secchi,<sup>1</sup> referring to animal life, says: "If any one maintains that there exists in the living animal a vital force, a source of energy independent of the ordinary molecular forces, and that there exists among them a chemistry different from that of inorganic bodies, he is wrong." Force, like matter, is never lost. Mechanic work generates an equivalent quantity of heat or of chemic force, and when heat is dissipated an equivalent quantity of chemic or mechanic force is evolved. "All change in nature," as Helmholtz<sup>2</sup> puts

it, "amounts to this, that force can change its form and locality without its quantity being changed. *Motion* and *warmth* of the animal body are best explained by Robert Mayer<sup>3</sup> in "Organic Movement in its Relations to the Mutations of Matter." The sun, as far as human knowledge extends, is an inexhaustible source of physical energy which pours upon our earth, and maintains the activity of everything which moves upon the globe. Plants store in a fixed form the light of the sun, and animals employ it for their own use. The living animal takes from the vegetable kingdom oxidizable foods to unite them anew with the oxygen from the atmosphere. Parallel with this result is manifested the characteristic features of animal life—work and movement. The chemic force contained in the food and in the oxygen inspired is the source of two manifestations of energy—movement and heat; and the sum of the physical energy produced is equivalent to the corresponding and simultaneous chemic processes.

"It is only since the discovery of Mayer and von Helmholtz," says Mosso,<sup>4</sup> "that we have known exactly how all forms of mechanical movement are a transformation of the heat of the sun, and that the will can awaken and call into action the chemical energy asleep in the muscles, but has no creative power. Animals and men can transform the matter which they are constantly introducing into their organism, can transform the forces which already exist in nature, but cannot create any of them."

*Animal Light.*—This is possibly caused by the slow

oxidation of a substance formed under the influence of the nervous system. Many creatures in the lower scale of life generate and diffuse light. The people of Vera Cruz use fireflies as lamps. Recent discoveries show that the depths of the sea teem with luminous fish, crustaceans and zoöphytes. These creatures have living lamps fitted with lense and reflectors. Acloque<sup>118</sup> has shown that the emission of light in fungi is a vital function, like respiration, and is accompanied, like the latter, with oxidation of tissue and the giving off of carbonic acid.

*Osmosis.*—This physical process influences life. It means the mixing of two liquids or gases by passage through a separating membrane. Osmotic pressure modifies the functions of the bodily tissues. Loeb has shown that fertilization in the lower animals can in part be supplanted by a definite increase of osmotic pressure in the liquid containing the eggs.

*Development.*—This is largely a reaction to food and environment. Dr. M. von Linden recently experimented to find the effects of feeding larvæ with different kinds of leaves. The larva of the *Ocneria dispar* feeds upon the leaves of the oak, but by feeding it with another kind of leaf a striking albino was produced. If the descendants of the albinos were given their normal food plant they gradually regained their typical color and markings. He found that the influence of light modified development, and among certain invertebrates and lower vertebrates the blue and violet rays of the spectrum caused more rapid development. The average hen lays only sixty eggs a year.

Professor Gowell of the Maine University has produced a hen that lays five times as many eggs as the ordinary hen. His results have been attained by recognizing the law of inheritance and by breeding only from birds that are themselves great producers.

*Nerve Force and Electricity.*—Nerve force has been identified with electricity. O'Brien says,<sup>5</sup> "I picture the nervous system and its mechanisms in living action before my mind; I see beside it the central telegraph system of New York or London, with its radii of lines and cables, telephonic and telegraphic; its multiple switches, batteries, relays, transformers, condensers, resistances, shunts, duplex and automatic circuits; all this mechanism, like the nervous system, transmitting force and translating intelligence from point to point by terminal instruments which move, talk, write, print, light, inhibit, accelerate and regulate and in one hundred ways doing what is done in the nervous system, and always by means of the same force—the only form of force capable of such vast and varied service." There is an intimate relation between electricity and chemic action. We know electricity by its effects; beyond this our knowledge does not reach. We know that electricity will decompose water, that it will deflect the needle of a compass, and that it will heat a wire through which it flows. Chemism, heat and light, the three great forces of nature, are directly interchangeable in rapidity and direction of the molecular vibrations. Thus from electricity we may obtain heat, light and chemic action. Chemic decomposition produced

by electricity is known as *electrolysis*, and the products of such decomposition are known as *ions*.

It is likely that the atoms composing the living animal tissue are merely ions which are the material carriers of electricity. Artificial electric stimulation of nerve fibers corresponds most nearly to their natural excitation, and we therefore assume in our present state of knowledge that nerve force and electricity are identical. Nerve fibers, whether at the periphery or in the brain, respond to the same kind of electric stimulation. It is very likely that all animal bodies create electric currents, and the effects depend upon the nature of the discharge. There are electric fish, and the discharge of an electric eel is sufficient to kill a horse. It is well known that electricity can be obtained by friction of the dry hair when the ambient atmosphere is favorable. It has been observed that the membranous coverings of the nervous system as well as other organs, act as electric insulators to retain the normal quantity of electricity in each organ. The feeblest electric stimulation of a nerve induces in it a chemic change, and for this reason nerve force is a physico-chemic process. With every contraction of a muscle an electric change occurs.

*Vibration and Life.*—The science which spans the gap between chemistry and physics is *physical chemistry*. Matter, according to recent investigations, is an accumulation of positive and negative electric charges, and the chemic elements are merely varying numbers and arrangements of these charges.

Atoms are supposed to be infinitesimal oppositely

charged particles known as *electrons*, which move in orbits and are thrown off from all highly heated or electrified bodies. If this theory is true, then the ultimate particles of matter and force are identical. Ebbinghaus speaks of the vulgar prejudice of the absolute distinction between mind and matter, and, like Spinoza, believes that they are but two aspects of the same thing. The oxygen atom consists of 11,200 units of electricity, hydrogen of 700, and radium of 157,500 units. These electrons are supposed to bombard space and its contents at the rate of from 50,000 to 100,000 miles per second, and by disturbances in the ether create what we know as fluorescence and the phenomena peculiar to the X-ray. In his recent "Introduction to Spectrum Analysis," Dr. W. Marshall Watts shows that in a drop of water the number of molecules is so great that if we could see them when the drop is magnified till it had apparently the dimensions of our earth they would appear like a heap of tennis balls, in number something like 9,556,000,000,000,000,000,000,000. Each molecule is subdivisible into three atoms, two of hydrogen and one of oxygen. In every atom of hydrogen there are some thousand electrified corpuscles.

Every phenomenon in nature is dependent upon matter in motion or vibration. Electric stimulation of a motor nerve will cause contraction of the muscle supplied by the irritated nerve. Taste perception is produced when the galvanic current is applied to the back of the neck; and the same current passed through the cheek, the percipient can recognize the specific



quality of each pole. Through the head the same current provokes a sensation of light, with color perception. Stimulation of the auditory nerve with the identical current induces sound effects. If the eye be struck a blow in the dark, the optic nerve is irritated and light effects are produced. It can be assumed in the latter instance that the transmitted concussion blow produced the sensations of light. Whether the source of irritation be electricity or concussion, it is impossible to conceive of conduction without vibration of atoms, and as every nerve molecule contains hundreds, the movement of the nerve atoms merely conducted the primary source of irritation to the perceptive centers. The physicist recognizes that the great space separating us from the sun contains no air or other known substance, and he is compelled to assume that this interplanetary space is occupied by a medium which he calls ether, whereby motion can be communicated from one point to another. In the accepted *undulatory theory of light*, the energy of the sun is received in the form of vibrations or waves, which when of suitable wave-length cause, through the eye, the sensation of light. Color is determined entirely by the number of waves emitted by a luminous body in a second of time or by the corresponding wave length.

The waves diminish in length from the red to the violet, and if they are too rapid they are not perceived and do not produce the sensation of sight. As with light, so with sound. If the waves of air beating upon the organ of hearing exceed a definite number of vi-

brations per second, the auditory sense cannot analyze sound. Just as we can modify the vibrations of stringed instruments, it is quite possible that what we call *inhibition*, let us say of pain, is nothing else but the inhibitory influence of the nervous system on the vibrations of the atoms in the nerve molecules. The action of morphine and other narcotics may be similarly explained. The nerve atoms can be so modified in their vibrations that sensation is either dulled or unperceived. Inhibition of pain is either the inhibition of pain itself, or its expression.

The tortures suffered by martyrs and prisoners of war illustrate such inhibition. Flagellants expiate their sin by voluntarily flaying themselves. The fakirs of India translated their pains into enjoyment when they precipitated themselves under the wheels of a Juggernaut car. I have seen fakirs in India pierce their lips and cheeks with pins and suspend themselves on hooks which had pierced the flesh of their backs without the least outward evidence of pain. Malingerers endure the severest tests without a murmur. This insensibility to pain is supposed to be achieved by self-induced hypnotism, which may mean nothing more than acquired control over atomic vibrations. Sensations are limited, and we only perceive a fractional part of the phenomena of nature.

Science is gradually breaking down the barriers of the unseen world. With the introduction of ultra-microscopy, which introduces a principle not unlike that of a beam of sunlight in a darkened room showing dust particles, objects as small as  $\frac{1}{1000}$  of a micron

can be seen, whereas with the ordinary microscopical technique objects less than  $\frac{1}{10}$  of a micron are not visible. The ultramicroscope is so powerful that chemical changes invisible to the eye or the microscope are made apparent. When the aërial waves are more than 36,000 vibrations per second the ear cannot recognize sound; when 18,000,000 vibrations have been reached we perceive a sensation of heat; 462,000,000,000 vibrations in a second produce a sensation of light, and as the vibrations gradually increase the eye perceives one color after another, until violet is reached with 733,000,000,000 vibrations to a second. Beyond the violet the vibrations are too rapid and vision becomes practically annulled. The ultra-violet rays which are now used in medicine have, like the X-rays, pronounced pain-relieving properties, and I can conceive such action as being dependent only on excessive vibrations of the nerve molecules corresponding to the rapid vibration of the light rays. In consequence of the rapid molecular vibration of the nerves, the pain, the agony, expressed by the nerves, is no longer translated as pain. The foregoing supposed action corresponds to tone vibrations which set other bodies in motion. Thus, if the A string of a violin is struck, the A string of a piano standing near sounds in harmony with it.

Of late the application of vibration to the human body has been employed for curative purposes, on the principle that in disease molecular vibration is lessened or abnormal, and disappears at death. The therapeutic theory in question is by no means chimeri-

cal, although it may lack precision in its present stage of imperfect development. What the vibratile treatment really aims to do is to restore the equipoise of the body by a rearrangement of the molecules or by raising their vibration to a normal standard of frequency. The property of assuming more than one elementary form is known in chemistry as *allotropism*. Thus the diamond, amorphous carbon and graphite are identical in composition, although showing different properties. The diamond may be converted into amorphous carbon and the weight of the latter after conversion will be the same as the diamond. The chemist does not explain allotropism beyond saying that it is dependent on a difference in the number of atoms in a molecule of the element, although he could as well have said a difference in the arrangement of the atoms. When Fourcroy and Vauquelin discovered crystals of urea in the body, they, in common with others, regarded them only as the products of vital energy; but this theory was exploded by Wöhler in 1828, who, by synthesis outside of the body, succeeded in forming urea by ammonium cyanide by the transposition of atoms. In music we are dealing with a series of vibrations which create pleasant mental images and emotions. Dr. Kennedy has recently shown how music influences the pulse rate and blood pressure. He noted that after the rendition of the overture of "Tannhäuser" the subjects responded with an increase in the pulse rate of from ten to twenty-five beats. "Meditation," a quiet, restful number, diminished the blood pressure and the pulse rate.

Horace in his Thirty-second Ode, Book I., concludes his address to the lyre:

*"O laborum, dulce lenimen, mihi cumque salve, Rite vocanti"*  
(O, of our troubles the sweet, the healing sedative)

A psychologist of the University of California has recently demonstrated that the so-called music of poetry is naught else but simple physical processes; that a line of poetry now means only the rate of the heart beat of its author, the regularity or irregularity of his breathing and the other peculiarities of his own physical being at the time he wrote the verse. Thus the study of poetry can no longer be confined to an analysis of the intellectual state, but must include the emotional and physical states.

As a stimulant to intellectual work, Bacon, Milton and others recognized the value of music. By means of the ergograph, Tarchanoff found that if the fingers were fatigued, music would restore their vigor. Sad music had the contrary effect. Experiments on dogs demonstrated that music augments elimination of carbonic acid and increases the consumption of oxygen, and that there is increased functional activity of the skin. Music, in consequence of its acknowledged physiologic action, has been employed in the treatment of many nervous affections, specially in mental affections; and in the classics we recall that the singing of birds was the method employed to cure the insomnia of Mæcenas. Allotropism doubtless exists in the living tissues, and some diseases may be said to be merely allotropic modifications of each other. One may say

that in disease there are inharmonious and in health harmonious vibrations. Just as pathology has been defined as the physiology of the sick, we may speak specifically, and say pathology is the physics of abnormal vibrations. By means of a tetanomotor, which is a small ivory hammer attached to an induction machine and arranged so as to deliver a rapid series of blows on a nerve, pain has been beaten into submission. The principle of the tetanomotor is practically this: you so rearrange the nerve molecules, or so inhibit their vibration, that they no longer conduct sensation. Machines for inducing vibration have of late been introduced to the profession in various forms, and they subserve a varied purpose, notably that of annulling pain, augmenting glandular secretions, and strengthening nerve energy.\*

In *etheric vibration* certain radio-active substances like radium, thorium, uranium, etc., give off ether vibrations without stimulation from any known source of energy. Such vibrations produce various kinds of spectra and set gases in vibration. Etheric vibrations evoked by the various forms of electricity used by the physician are well known. In medical literature I have repeatedly referred to certain *organ reflexes* evoked by cutaneous irritation. What I have called the *concussional vertebral reflexes*<sup>6</sup> represents an entirely new domain; and one may, in studying them, be very readily convinced that the manipulation of the

\* "*Mechanical vibration and its therapeutic application*" is admirably set forth in the recent work on this subject by Dr. M. L. Arnold Snow.

spine by the osteopath and the effects on the patients are not wholly a question of suggestion; on the contrary, the osteopath unknowingly elicits many visceral

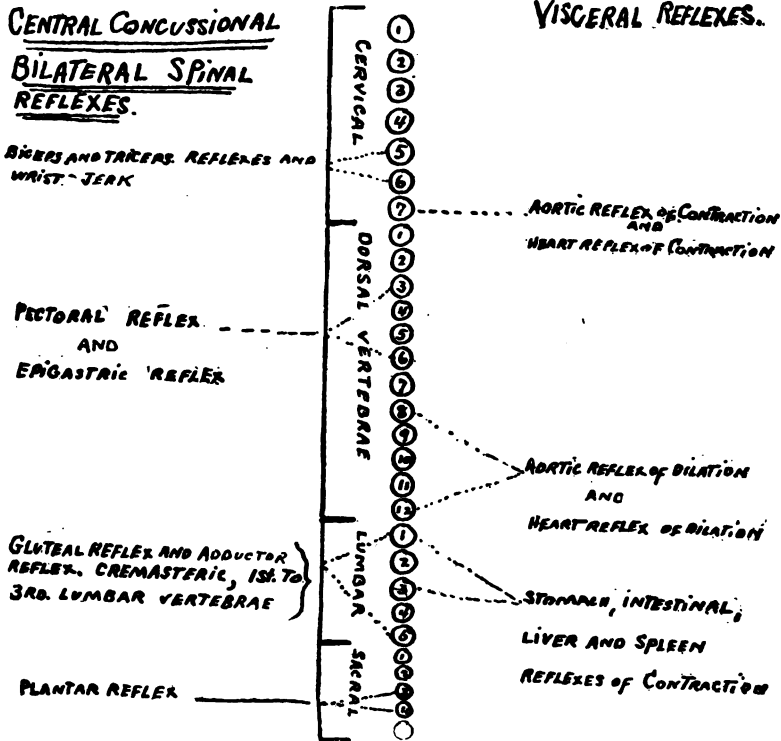


FIG. 1.—Vertebral concussional reflexes, showing the vertebrae to be concussed for their elicitation.

reflexes which may operate for good or evil. Concussion of the vertebral spinous processes, whether by manual manipulation or by vibratory massage, will

induce palpable lung, heart, liver, spleen, stomach and intestinal reflexes depending on the vertebrae subjected to concussion.

*Man as an Automaton.*—First, we must speak of the *dual mentality of man*. The mind is one, but a part of it is always conscious and another part is never illuminated by consciousness. These two minds have been differentiated into *objective* and *subjective minds*. They have been likened to the spectrum of the sun. There is a visible and invisible part of the spectrum. We do not see the infra-red or ultra-violet rays, yet we know that heat is mainly derived from the former and chemical changes from the latter. The objective or supra-conscious mind takes cognizance of the objective world through its media of observation, the senses, and represents the supreme function of reasoning; in other words, it is the mind of intelligence. With the subjective or subconscious mind one's environment is recognized independent of the senses; it perceives by intuition. It is the abode of memory and the emotions. It executes the highest functions when the objective senses are in abeyance. Much of the activity of the human mind occurs below the plane of consciousness in the so-called subconscious or subliminal mentality. The phenomena of vegetative life, respiration, circulation, nutrition, etc., are produced in the subconscious state, and without voluntary effort. This automatic action is demonstrated in a decapitated frog. If a drop of acid is placed on the latter, it executes with its forelegs and trunk all the movements of intelligence necessary to remove the offending source of



irritation. Such reflex acts are so perfectly coördinated that one is constrained to believe that in the spinal cord a subsidiary brain exists.

James<sup>8</sup> expresses the same belief when he observes: "If purpose remains the same where the means are different, there is mind." Maudsley<sup>9</sup> affirms that consciousness is not coextensive with mind, and that the whole business of mental function as work might go on without consciousness, just as the machinery of a clock might work without a dial. Repeated experiments on animals demonstrate that psychic acts can be performed when the highest psychic centers have been extirpated. Mental action has been shown where the brain is absent, and Schofield<sup>10</sup> cites Macpherson, who records a case where mental action appears to be present even in the independent functions of the spinal cord and its ganglia. The latter says that a mere segment of an earwig will fight with a segment of an Australian ant, under the unmistakable influence of rage, until exhaustion or death ensues. Duval refers to a man as functionally decapitated, who, when absorbed in meditation, unconsciously and without subsequent memory brushes away a fly which alights on his hand. Eating, drinking, walking, in short, the essential acts of life, are but a mass of habits, and eventually conform to the *laws of habit*. Their repetition eventuates in reflex actions. It is wise that this is so, otherwise the mind would be so occupied that acts requiring volitional deliberation could not be executed.

I often recall the observation of Franklin, that, when

he considered to what bad uses human reason is often applied, he was ready to wish that Providence had bestowed on man a sensible instinct in its stead. Instinct is an adaptive impulse in the absence of intelligence, yet instinct is made up of reflex acts purely automatic and without the domain of the mind. The bee constructs a perfect cell without a mathematical education, birds migrate without chart or compass, and animals avoid danger with more precision than a woman crossing a busy street, without any idea of life or death. Instinct is a mere expression of forces. The movements of animals are as irresistible as the force which causes the magnet to attract iron filings. In fact, all the phenomena of the animal body are only vital demonstrations of chemistry and mechanics, and the inevitable tendency of science is to prove the intimate relation which exists between life and the material world. The cognates of instinct are becoming rapidly atrophied from disuse. The sense of smell in many animals is more acute than in man. The Arabs of the Sahara desert, it is alleged, can detect a fire a distance of thirty miles, but civilized man is gradually losing this important sense.

Hearing is another degenerate sense, and, as Hoffman<sup>32</sup> says: "Whenever we want to enlarge our capacity for hearing, we at once resort to some mechanical contrivance for supplementing its waning power." The psychology of *myopia*, or near-sightedness, is an interesting study. It shows that civilized man has become estranged from communion with nature, which is so essential for the development of long-range vision.

Well-fitting glasses have frequently achieved the marvelous task of suddenly translating a pessimist into an optimist, so essential is vision for our condition of well-being. The use of machinery is fast relegating the hands to oblivion. The human muscle shows the greatest decline, and Drummond<sup>38</sup> asserts that man has now but little use for mere muscle, on which his whole life once depended. Agility, nimbleness and strength, once a stern necessity, are now either a luxury or a pastime. The brain alone continues to develop, not by any increase in its size, but in its complexity.

Every emotion is simultaneously an instinct, and every physical reaction to an emotion is the natural expression of protection. We have long recognized the almost intelligent function of muscles, whether displayed in fixing a diseased joint or spine or in protecting an inflamed serous membrane. The healing power of nature is best expressed when instinct dominates intelligence, and if statistics could be adduced they would favor the contention that the cure of disease is a more difficult task with intelligent than with the ignorant classes. Dr. Sartorius,<sup>7</sup> of the "Antiseptic Club," made the sapient observation, "If physicians could decapitate their patients the treatment of disease could be simplified." The story is related of a patient who, receiving a prescription from his physician, was told "that it would do him a power of good." At the patient's next visit he was asked "if he took his medicine regularly." The patient replied that "it was unnecessary; he had swallowed the prescription according to directions, and, 'it had done him a power of good.'"

The attitude of the average patient is not that of "a voyager who resigns himself to the captain and does not look for the further shore until the time comes." Patients are always immersed in an atmosphere of mystery, and the physician is persuaded to recognize the truism: "What is obvious can rarely be brought into a successful competition with what is vague and obscure in the treatment of diseases." Most people are more easily enraptured by the meretricious trumpeting of the charlatan than by the subdued claims of science and truth. Patients who have acquired their disease in most instances by defying the laws of nature strive to abrogate these very laws in the attainment of health. The subconscious mind has furnished material for many of the most sublime inspirations of the poet, painter and novelist. The arithmetical prodigies who instantly solve abstruse problems in their heads probably achieve their results through the action of the subliminal self, for many of them know nothing about mathematics, lack general intelligence, and do not even know how the answers came to them. Some have sought to explain the "lightning-calculations" by automatic brain action, and have compared the brain to the calculating machine.

*The Essential Morphologic Elements of Life.*—The cell theory was first definitely established by Schwann, in 1839, who demonstrated that the tissues of animals and plants consist of cells which are developed from pre-existing cells (*omnis cellula e cellula*), and are usually connected with one another by processes. In 1858 appeared the "Cellular Pathology" of Virchow, which

embodied the conception that the activities of an organism are the sum of the activities of its component cells. This work demonstrated the unity of life of all organized beings. The cell is the most elementary form of organized substances, whether we refer to animals or plants; in other words, it is the histological element incapable of further reduction, other than by mechanic or chemic means. It is fully conceded that to properly study the cells, investigations must be extended to unicellular forms as representing the simplest conditions of life. The chemic changes in the living body are *cleavage* and *oxidation*. It was formerly believed that the chief oxidative changes took place in the blood and body fluids, but we now consider the tissue cells as the chief seat of oxidation.

Substances easily oxidized, like lactic acid, are scarcely affected by the blood. Uric acid is dissolved in the isolated liver of the mammals by the living cells; thus the blood acts chiefly as a vehicle for the oxygen which is conveyed to the cells. In the action of the cells chemical tension is translated into living energy. Animal tissues possess the power of breaking up the albumin molecule and may thus be compared to the action of pepsin and trypsin. Such action is dependent on the presence of intracellular ferments which act as catalyzers. Animal tissue digestion is known as autodigestion or autolysis. Autolytic ferments have been extracted from nearly all the organs. Specific catalytic agents known as oxidizing enzymes or oxydases are widely distributed in the body. A pertinent example of this oxidizing property is shown

when hydrogen peroxid solutions come in contact with pus, blood or tissue cells; the ferments oxidize hydrogen peroxid to water and free oxygen gas. One of the simplest forms of living beings is the *Amœba*, a minute organism found in damp earth and stagnant water. Examined microscopically, it consists essentially of a small lump of transparent material endowed with vital properties, and is called *protoplasm*. The latter is the active living base of all our tissues. It consists of 95 per cent. of water, and is therefore practically in solution. In the center of the protoplasm is an oval body, called the nucleus. The former together with the latter constitute a cell. Insomuch as living organisms have been discovered without nuclei, the latter are not regarded as essential to cells; hence, a cell may be regarded as a mass of protoplasm. *Amœbæ* are endowed with locomotion, ingest and digest food, respond to stimulation—in fact, show all the properties of higher living organisms. Sir William Dawson observes that an *amœba* shows passion, volition, and appetite. He describes one attempting to swallow a one-celled plant as large as its own body, but failed again and again, until, finally convinced of its hopelessness, flung itself away and made off in search of something more manageable. Man is made up of an enormous aggregation of cells or protoplasmic masses like the *amœbæ*. The cells, however, have varied and specific functions. Some are specially endowed for digestion, others for respiration and reproduction. They are further differentiated by shape and size, as though destined to perform a

special line of work. Man, then, is but an amœba of larger growth. He is a multi-cellular, in contradis-

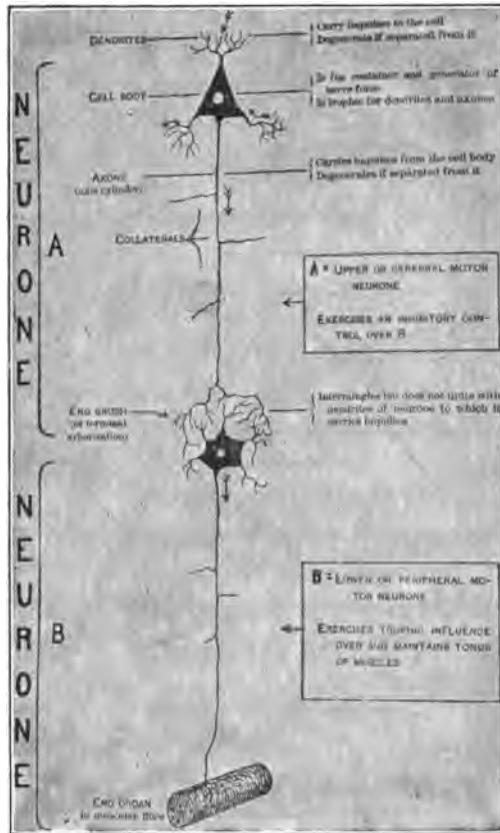


FIG. 2.—The neurone (diagrammatic) after Butler.

inction to the amœba, which is a uni-cellular organism. Man thus effects, as Edwards puts it, "a physiological

division of labor." A collection of cells endowed with a specific function is spoken of as an organ. In accordance with advanced research, the protoplasm of the cell is made up of microscopic atoms held in suspension by electric charges.

The cellular structure of the *nervous system* is of special interest to us. The modern conception of the nervous system conceives it to consist of an enormous number of units, called *neurones*. Each neurone consists of a *cell body*, *dendrites*, and an *axone*.

In the neuron architecture of the nervous system the neurones are in closely packed groups intimately connected with each other, but never directly. Each neurone, with its axones and dendrites, is anatomically independent, and the latter do not anastomose with another neurone. The neuron mass receives impressions from within and without the body, and sends forth other impulses, which regulate the functions and establish a harmonious relationship between man and his environment. The outer covering of the brain called the cortex is the seat of intelligence, and it is in this situation that the nerves distributed throughout the body terminate. If the cortex, which is gray in color, were spread out horizontally it would be twelve inches in length, eleven inches in width, and one inch in depth. It is composed of a vast number of cells or neurones, estimated at 9200 millions. Each cell varies from  $\frac{1}{300}$  to  $\frac{1}{3000}$  of an inch in diameter. In the cortex the cells are collected in groups or centers and are presided over by the mind, which controls our bodily movements and generates our thoughts.



It is generally accepted that the cells in the cortex represent the abode of memory, and that in each cell is fixed some past thought or experience. Each new thought develops or modifies an old or generates a new one. The greater the intellectual development of the brain, the greater the number of cells. Some of the centers have been clearly defined. Thus the center of vision is in the back of the brain (*occipital lobe*) and the center of hearing is in the temporal lobe. If we irritate by electricity the centers presiding over the movements of the limbs, we will provoke movements in the latter without implication of the mind either in producing or inhibiting them. If such centers are removed, no movements either by natural or artificial stimulation result. Like all cells, the neurones do not react to the same stimulus. Electricity with weak currents increases, and strong currents decrease, cell activity. Chemical stimuli act variously—some cause contraction, some augmented movement, and others increased secretory action. What is known as *chemotaxis* is the property of certain cells to respond to the stimulation of chemical substances introduced into or generated within the body. If the chemical substance causes the cells to approach them, it is positive, and if they repel them, negative chemotaxis.

## II

### MAN AND HIS POISONS

#### ANTECEDENT HISTORY OF SELF-POISONING—INTESTINAL SELF-POISONING—THE ORGANS OF DEFENSE—THE MODERN CONCEPTION OF DISEASE

*Antecedent History of Self-poisoning.*—Many prolix problems in the study of disease are identified with self-poisoning, or, as it is technically known, *auto-intoxication*. About this subject we know very little, and are not sure of that. The theory of self-poisoning was no doubt a primitive conception. Traditional practices are frequently based on theories, however false. "It is the accumulation of our experiences," says Mundy, "that makes our empirical knowledge, at last, scientific fact." And did not Oliver Wendell Holmes say that "after all, medicine is mainly a question of probabilities?" When Brown-Séquard demonstrated that the testicular principles of animals provoked a stimulating and exciting influence on the system, he merely emphasized a truism that was antedated by analogical argument. In logic, analogy refers to inferences drawn from resemblances; spring suggests youth, winter, old age. In comparing objects and finding resemblances we are guided by the experiences of our mental life. When the Zulu chews a piece of wood to soften the heart of the man from whom he wishes to buy cattle, or of the woman he courts, or when the Bornean makes

a wax figure of his enemy, in the belief that, when the image melts, so will the body of his enemy waste away, analogies of resemblance are created. The wood of the Zulu symbolizes the hard heart, and, because chewing softens wood, it will be equally effective with the heart. The Malayan consumes the flesh of the tiger when he wishes to become endowed with the sagacity of that animal, and the Dyaks eschew deer, fearing to become faint-hearted. The body of Captain Wells, who was killed near Chicago in 1812, was cut up and distributed among the Indians, who were desirous of absorbing some of the courage of a brave man.

Symbolism is also characteristic of analogy. Thus the Chinese physician will select a plant for its medicinal virtues because it resembles a human being, and he uses the head of the plant for affections of the head, and the roots for ailments of the extremities. Superstition and folk-medicine bear the imprint of analogy. Toads are supposed to cause and cure warts because the warty skin of the toad suggests warts. Fevers are associated with heat and blood, therefore anything red is good for fevers. When the son of Edward II. had variola the physician suggested the use of red bed furniture. Traditional systems of treatment are based on the supposition of *sympathy*. Paracelsus used a "weapon salve," which was applied to the weapon which produced the wound. Some years ago, while in Tokio, I witnessed the exhibition of a fakir who was selling a "wound-salve." First he anointed a sword with the salve and, drawing the blade of the sword across his arm, demonstrated that it did not wound his arm. The implied con-

clusion was that if the salve prevented the sword from causing a wound, it was equally effective in curing it. Next he removed the salve from the sword and, running the edge of the latter across his arm, caused a fluid resembling blood to appear. The sword had a double edge, one side sharp and the other dull, and it was the dull edge which was brought in contact with the arm in his preliminary demonstrations. When the reddish fluid appeared he ran the sharp edge of the sword across a bag of colored fluid which was adroitly concealed in his hand. The doctrine of sympathy is expressed in folk-medicine when one is enjoined to "take the hair of the dog that bit you."

The traditional value of many drugs is based on resemblance. Plants resembling teeth were employed for toothache; walnuts for mental diseases, because they conformed to the head—the green covering represented the pericranium, the shell, the skull, and the kernel the brain. The red rose was used for blood and yellow flowers for liver diseases. The Chinese ascribe to ginseng great remedial value because its roots resemble the human form. Etymologic superstition is common. Thus in the Bible mandragora is regarded as an erotic plant. This superstition is evidently associated with the Hebrew name of the plant, which likewise signifies love. Clodd avers "in every department of human thought evidence of the non-persistence of primitive ideas is the exception rather than the rule. Scratch the epiderm of civilized man and the barbarian is found in the derm." Jastrow<sup>11</sup> observes: "Create a belief in the theory and the facts will create themselves."

The Asiatic nations in ancient times employed the excretory products of animals, based on the theory, as Pliny tells, that animals eat and digest plants, the medicinal parts being excreted in the fæces, therefore the latter excrement will cure disease.

The ancient Hebrews prohibited the consumption of flesh containing blood, therefore meat was exsanguinated before ingestion. "The blood is the life." Aside from their supposititious conception of the seat of the soul in the blood, an idea entertained also by the Arabs and Romans, the latter fluid was no doubt recognized as it is now, a medium for the conveyance of poisons which man generated within his own body. That this interpretation is correct is based on the other sagacious hygienic laws. Thus fat from the interior of the body was prohibited, as its juxtaposition to lymph glands (the filters of diseased products) contributed to disease. Menstruation was, at one time, believed to be the natural means of discharge of bodily impurities, and Pliny contended that on the approach of a menstruating woman fruit would fall from the tree and seeds which she touched would become sterile. She was described as follows: "O, menstruating woman, thou'rt a fiend from whom all nature should be closely screened."

Ellis <sup>12</sup> tells of a member of the British Medical Association, who in 1878 wrote to the *British Medical Journal*, asking whether it was true that if a woman cured hams while menstruating the hams would be spoiled. He had known this to happen twice. *Blood-letting* and "spring-cleaning" were no doubt thera-

peutic methods based on the theory of self-poisoning. I once had occasion to question a charlatan respecting the ingredients of a popular medicine which he sold. He answered that the main ingredient was a purgative which achieved a dual object: first, most people were satisfied if they had a daily bowel movement; second, such a drug demonstrated a physiological action which most people could appreciate. Truly, 'some people's conception of heaven is a purgative! "Put your trust in God and keep your bowels open," said a good Methodist parson to a sick sister. So potent an influence does a free evacuation have on the condition of well-being, that even Voltaire was induced to write: "Those persons who are in good position, whose bowels are freed by an easy, regular, peristaltic movement every morning as soon as they have breakfasted—those who are thus favored by nature are mild, affable, gracious, kind. A 'no' from their mouth comes with more grace than a 'yes' from the mouth of one that is constipated." "Talk of champagne," said Byron; "nothing cheers the spirits like a dose of salts." The melancholy moods of Byron were caused by intestinal poisoning. Byron said that when he was writing "Childe Harold" he was tempted to blow his brains out; but he didn't because it would have pleased his mother-in-law.

In Le Sage's caricature of the phlebotomizer abundant bleeding and repeated draughts of water were regarded by Sangrado as the secret of health. Bleeding was so inconsistently practiced by the past generation of physicians that it merited the rebuke of Van Helmont, that "a bloody Moloch presides in the chairs of

medicine." Sweating was also added to the list of therapeutic methods for ridding the body of poisons, and some one thus travestied the practice of Dr. I. Lettsom:

When patients comes to I,  
I physics, bleeds and sweats 'em;  
Then—if they choose to die,  
What's that to I—I let's 'em [I Lettsom].

In Bacon's treatise on life and death, blood-letting and the use of saltpeter are recommended for attaining old age. Eighteenth century quacks employed as an elixir of life a "holy water" which was purgative in its effects, and consisted of an infusion of senna. In Hufelands' work, published at the end of the eighteenth century, on "La Macrobiotique; or, the Art of Prolonging Human Life," vegetable, in lieu of animal, food, was recommended, owing to the liability of the former to putrefy.

Poisons are common to animal and plant life. The arrows used by many savage tribes are anointed with vegetable or animal poisons. Instances of insect-stings producing death have frequently been reported, especially in tropical climates. The wounds of centipedes, tarantulæ, and scorpions have proved fatal. In this country death has followed the bite of a spider, wasp, and mosquito. The most characteristic of animal poisons is the venom of poisonous snakes. It is estimated that in India the annual number of deaths from snake-bite exceeds twenty thousand. The snake poison is transmitted to the victim by means of a fang which is connected with a gland in which the poison is contained.

Enraged animals, wild and domesticated, may transmit fatal poisonous wounds. In the literature one finds numerous deaths reported from the bite of a man, swine, birds and domestic poultry. The human body contains the most deadly poisons made innocuous by physiologic metabolism. We have phosphorus in the bones and blood, hydrochloric acid in the stomach, potassium sulpho-cyanide in the saliva and even arsenic is found as a normal ingredient. Brunton, in "Lectures on the Action of Medicines" tells us, that the saliva of some men is nearly as poisonous as the venom of a serpent. He further assures us that the juices of various glands when injected directly into the blood will kill an animal as quickly as a rifle bullet, but entering the blood from the glands in a normal way, not too much at one time, they preserve the balance of the body and prevent disease.

Self-poisoning was first clearly recognized by Charles Bouchard in his work "*Leçons sur les Auto-intoxications dans les Maladies*," published in 1887. Man, said he, is constantly standing, as it were, on the brink of a precipice. Every moment of his life he runs the risk of being overpowered by poisons generated within his system. The healthy and unhealthy body are a receptacle and laboratory of poisons. Self-poisoning is only inhibited by the healthy action of the skin, lungs, bowels, and kidneys. Poisons are contained in the food, produced during normal digestion, and exist in the fluids and tissues of the body, and yet the healthy individual is not poisoned. The poisons of man are



manufactured normally in the intestines and in the cells of the body; thus two types of poisoning are recognized, *gastro-intestinal* and *cellular poisoning*.

*Intestinal Self-poisoning*.—All living animals and plants contain substances in their excretions which are toxic to the organisms which excrete them. Even normal secretions of the human body are poisonous when brought in contact with tissues with which there is no physiologic relation. Thus, bile absorbed into the blood destroys the blood cells; brought in contact with the cells of the pancreas it likewise destroys them, although such destructive action is not noted on tissues which are brought into physiologic relation with the bile. In the stomach and intestines poisons are created by fermentation and putrefaction of the ingested foodstuffs. Fermentation and putrefaction are dependent on the action of germs normally introduced in the food. While the usual intestinal poisons are from bacterial fermentation, there are also poisonous *albumoses*, *i. e.*, intermediate products formed in the digestion of albuminous foodstuffs. The poisonous products of germs are called *toxines*. The bacteria of the human intestine, according to Strassburger,<sup>98</sup> increase at the rate of 128,000,000,000,000 each day. They are most numerous in the large intestine, the digestive portion of the intestine containing comparatively few. This bacterial flora constitutes a third of the human excreta. As will be shown later, the presence of germs is not absolutely essential for our well-being; indeed, digestion of varied kinds of food is possible even when made sufficiently sterile to exclude germs from the alimentary

canal. The bacteria normally inhabiting the intestinal canal are essential to animal life, as they assist digestion, prevent infection from harmful germs which may be present, and hasten by the products of fermentation the peristaltic action of the bowels. It is well known that when peptones and albumoses (normal products of digestion) are injected directly into the blood they are very poisonous, and even fatal, in their effects. As before remarked, fermentation and putrefaction are so essential to digestion that they do not cease even when food is not ingested for prolonged periods. Fermentation is chiefly confined to the stomach, and implicates the carbohydrates, whereas putrefaction is limited to the intestines and involves the proteid foodstuffs. In self-poisoning of gastric origin two conditions are assumed: either the absorption of normal products of digestion or the absorption of poisonous products in indigestion. The drowsiness which many people experience after a heavy meal is no doubt due to a mild form of poisoning from absorption of the normal digestive products. The *bacterial intestinal poisons* originate from three sources:

First. From dead bacteria (proteins). Thus tuberculin is a product of the tubercle bacillus.

Second. From *ferments* or *toxins* excreted from living bacteria. It is generally accepted that the specific toxins are closely related to the ferments.

Third. From *ptomains*, which are poisons produced by bacteria acting upon certain food materials like milk, cheese, meat, etc.

Other poisons produced by putrefaction are indol,

phenol, skatol, cresol, leucin, tyrosin, ammonia, sulphuretted hydrogen, fatty acids, oxalic and uric acids, and the xanthin bodies. Of all these products from the bacterial fermentation of albuminous foodstuffs indol is the most easily absorbed from the intestinal canal, and the most readily recognized in the urine. Charrin and Le Play,<sup>92</sup> in their investigations with the intestinal poisons, show that there is a phenomenon called *auto-function*, *i. e.*, that a substance derived from a single organ stimulates that particular organ to increased activity. Thus urine increases the flow of urine and thyroid extract stimulates the thyroid gland. They establish the important fact that in treatment it is often more necessary to strengthen the ramparts than to attack the enemy.

*Cellular Self-poisoning.*—In the intestinal canal we dealt with poisons developed from fermentation and putrefaction of foodstuffs; in cellular poisoning we are dealing with poisons which are elaborated from the cellular constituents of the body independent of bacterial action. The living cell produces ferments called *enzymes*, which split up the living cell. We are constrained to exclude germs from this participation in the breakdown of the cells for the reason that it has heretofore been a fundamental conception that the living healthy animal tissues were sterile. Adami,<sup>13</sup> however, has disillusionized us in that respect, for he shows that the colon bacillus very frequently enters the blood from the intestine. He speaks of *subinfection*, indicating thereby a fairly constant condition in which bacteria gain access to

the tissues and blood from the intestine, which under certain conditions may bring about infection. Osler says that "a man rarely dies from the disease from which he is suffering," *i. e.*, he may be ill of a specific infection, but other germs actually cause the fatal issue. This conception is similar to what Flexner calls *terminal infections*, the patients, owing to their diminished vital resistance, dying from the action of other germs. The future surgeon who desires to attain the greatest success will be compelled to prepare his patient for an operation by starvation and purgation to avoid post-operative accidents. The cell, as we have shown in the previous chapter, is essentially made up of a nucleus and protoplasm, and both furnish products which are known as leucomains. Some leucomains are highly toxic, while others are inert, and in most instances closely resemble the vegetable alkaloids. Leucomains are differentiated into *nucleinic* and *creatinic*.

The former are the constituents of the nucleus of cells called nuclein, and upon the addition of water or dilute acid the latter may be broken up into leucomains, known as guanin, hypoxanthin, and xanthin. The latter may cause toxic symptoms when injected into animals. Of the creatinic leucomains, creatin is found in the thyroid gland, brain, blood, and urine. Gautier found xantho-creatin, the most toxic of leucomains, in fresh muscles, which produces in animals depression, vomiting, diarrhea, and somnolence. Moroni found the same substance in the muscles of an exhausted dog and in the urine of fatigued soldiers.

Leucomains are constantly manufactured in animal tissues and are destroyed by oxidation; but, if for any reason the latter process is inhibited, poisoning results.

*The Organs of Defense.*—In the norm the poisonous substances in the gastro-intestinal canal are either not absorbed, or, if they are, they are made innocuous and rapidly excreted. *Auto-protection* of the organism against self-poisoning is achieved either by organs which arrest or transform the poisons or eliminate them. The organs of defense practically represent the bodily resistance. This equationally expressed for germ infection is applicable to auto-poisoning, viz.,

$$D = \frac{PTA}{R}$$

D, the disease, equals P, the poison, multiplied by T, its toxicity, multiplied by A, its amount, the product being R, the resistance of the individual attacked. The organs which arrest the poisons are the liver, spleen, gastro-intestinal mucous membrane, lymph glands, adrenal bodies, thyroid gland, etc. The *liver* is unquestionably the chief organ of defense. It converts the poisons into non-toxic and assimilable substances, filters them, and excretes them in the bile. When the liver function becomes insufficient the poisons destined for destruction enter the blood, and the clinical picture of *hepatic toxemia* results. Aside from the antitoxic action of the liver, it is also concerned in the following functions:

First. It produces bile.

Second. It stores the excess of carbohydrates as glycogen and converts it into sugar.

Third. It produces urea from ammonia and carbonic acid.

There are other, but not definitely determined functions.

If the liver is excluded from the general circulation by connecting the portal vein with the inferior vena cava, nervous manifestations and even death may follow the ingestion of meats. The organs of elimination are the skin, lungs, kidneys, and intestines. Body substance elimination by the various excretory channels has been divided by Hammarsten as follows: By the lungs, 32 per cent.; by the kidneys, 46-47 per cent.; by the skin, 17 per cent., and by the fæces, 5-9 per cent. The lungs give off carbon dioxide and water; the kidneys, water, inorganic salts, and the nitrogenous compounds (urea, uric acid, hippuric acid, etc.); the skin, water, inorganic salts, and mere traces of nitrogenous compounds (urea), epidermis formations, sebum, etc.; the fæces, digestive secretions, undigested food, etc.

*The defense of the organism* is best illustrated by studying the action of bacteria in the body. Bacteria and their toxic products show local (irritation and inflammation) and general symptoms. The latter consist essentially of an intoxication, whereby the protoplasm of the cells degenerates, the decomposition of albumin becomes increased, and the excretion of nitrogen is augmented. Most of the latter effects result from secretory products of the germs known as toxins. The latter produce in the body anti-bodies called *anti-toxins*. The fundamental principle of the now accepted *Ehrlich theory* is that the toxin molecule forms a firm

chemical union with the protoplasmic molecule of the cell. The body protects itself variously against the pernicious action of the germs and toxins. Nearly all the secretions retard the development of the germs. The lymph glands filter the bacteria and their products. The natural resistance of certain individuals to infection is largely determined by the energetic activity of the cells, particularly the leucocytes which destroy the bacteria. But the fluids of the body, especially the serum, which contains no cells, possess the same bactericidal property as the latter. Now the normal blood is supposed to contain chemical substances (*alexines*) with a fermentative property which is developed in the presence of bacteria and destroys them. In toxin immunity protection is afforded by antitoxins. Other protective substances are the *agglutinines* and *bacteri-olysines*, which are the products of the cell activity of the organism which react to the toxins of the bacteria and, by destroying the latter, secure immunization. We know that after a meal the white blood corpuscles increase in number (*digestive leucocytosis*), and we also know that nearly all intoxications and infections produce the same result. Proteid food influences the result more than farinaceous or mixed diet. In some diseases of the stomach and intestines this post-digestive leucocytosis does not occur. It may be assumed that the organism in health protects itself against absorbed products of digestion by an increase in the number of leucocytes which remove and destroy the irritants.

*The Modern Conception of Disease.*—Schwann's

discovery of the animal cell resulted later in the conception that, insomuch as human tissues are made up of cells, and that man develops through cell activity, the corollary was evident—that if health depends on normal cell reaction, which is essentially the chemistry of life, in disease the reaction is abnormal. Virchow, in 1880, formulated the following conclusions:

First. An elementary diseased process consists of an external influence (*the cause of disease*) acting upon a living cell and altering it in a mechanical or chemical manner. The altered condition is disease.

Second. The cell reaction so varies that in one instance the cause may only bring about irritation, in another only a disturbance, and in still another instance paralysis of the cell.

It is as difficult to understand this variability in reaction as it is to follow the course of a chemical reaction. In dealing with the protoplasm or essential element of the cell, we can only conceive protoplasmic molecules, for they have never been demonstrated. The phenomena of protoplasm are reactions dependent on many conditions. The bacteria of anthrax do not proliferate in a frog, yet if the frog has been previously placed in an incubator the heat will so reduce the cell resistance that the animal will become susceptible to anthrax inoculation.

We can better illustrate the trend of our contention by citing pulmonary tuberculosis as a paradigm. We have learned that the medical treatment of this disease is a monument to sepulchred theories; that the patient must be put in nature's place and work as nature works,



and the nearer and truer he is placed to Mother Earth, and the closer his intercourse with nature, the more certain he is to attain health, for "diseased nature oftentimes breaks forth in strange eruptions." The tale of a consumptive does not begin and end with the tubercle bacilli. Bactericides may be effectual in the laboratory, but not at the bedside. There is a vast difference between a culture tube of bacilli and a patient. The treatment of phthisis is no longer based on the destruction of the bacilli, but in fortifying the cells against bacillary invasion. The tubercle bacillus is only a mere accident in consumption, for, without the receptivity created by diseased cells no infection can occur. If we are unable to cure an accessible tuberculous lesion, say of the skin, by bactericidal drugs, is it not chimerical to assume, or even hope, that such agents can ever be effective in remote pulmonary lesions? Germs are bound to be recognized as mere scavengers. Professor Neilson of Glasgow is alleged to have discovered a microbe which devours all dangerous germs and turns poisonous sewage into water as pure and healthful as that from a spring.

There has lately been exploited a chemical in lieu of a microbic theory of infectious diseases. Benjamin Moore<sup>88</sup> observes that there is no proof that the infective agent is necessarily a living cell, and that infection may be carried by non-living chemical substances. He refers to the great resistance of vaccine virus to various disinfecting agents as evidence of the chemical nature of this particular virus, insomuch as it remains potent after months of exposure to disin-

fectants, notwithstanding such exposure is more than sufficient to kill all germs. Some have regarded disease as nature's method of extermination. As before remarked, two elements are necessary in infection—the germ, and the receptivity or reaction of the organism. This interaction of host and parasite is illustrated in the side chain theory of Ehrlich, viz., the toxin is only poisonous when it can unite with some corresponding chemical constituent of the cell, otherwise it is innocuous; and when these constituents enter the blood they become antitoxic or protective by uniting with the toxin, and thus prevent the harmful combination of the latter with the cells. Expressed in other words, it means that if the chemical agent remains in the cells, it creates a toxic process, but is curative when it enters the blood stream.

### III

## FATIGUE

INTELLECTUAL FATIGUE—MORBID FEARS—OBSESSIONS  
—MORBID INTROSPECTION—LAWS OF FATIGUE—  
MINOR INSANITY AND THE PASSING OF NEURAS-  
THENIA—THE IDENTITY OF FUNCTIONAL NERVOUS  
DISEASES

Lavoisier contended that life was a chemical function, and that fatigue was a chemical process. The physiologist finds a muscle an available object for studying fatigue. It is well known that with each contraction of the muscle oxygen absorption is increased with augmented elimination of carbonic acid. If a frog's muscle is stimulated it contracts and will continue to contract more and more feebly, until finally there is no longer any response to stimulation—it has lost its irritability. What occurs? Fatigue products have accumulated in the muscle, and the most conspicuous of the waste products is lactic acid. If an overstimulated or exhausted muscle is left alone, it will recover its former irritability, but the recovery may be hastened by passing a stream of blood or salt solution through the blood vessels of the muscle. This experiment demonstrates that fatigue of the muscle is caused by the accumulation of fatigue products, and when they are washed away the tone of the muscle is restored. Massage of the muscles rapidly removes the evidence of

fatigue, simply because the waste products from the muscles are washed away into the circulation. We may induce fatigue artificially by "feeding" the muscle with a dilute solution of lactic acid. A watery extract made from an exhausted muscle will, when injected into a fresh muscle, cause the latter to lose its energy, which is, however, soon restored after washing. It has long been known that a fatigued muscle is acid, and in repose it shows an alkaline reaction. Similar to the muscles, the neurones or nerve cells are available objects for study. The investigations of Hodge upon the histology of fatigue were epoch-making. He compared under the microscope the cells of various animals captured in the morning with cells of animals of the same species killed after an arduous day's exercise, and noted that the latter demonstrated palpable changes in the protoplasm and nuclei of the fatigued cells. In the tired cells the nuclei became smaller and the protoplasm revealed a shrunken appearance. It has also been shown that the poisons generated within the body induce decided changes in the nerve cells. Fatigue has been defined as a "decrease in capacity for work," although it is essentially a chemical reaction of poisons on cells.

Nerve cells are sensitive to varying conditions of the system, especially blood changes. They contain little angular bodies that stain deeply with aniline dyes, and have been called after their discoverer, Nissl bodies. It is supposed that these bodies contain stored-up energy, and that following massive discharges of nerve-impulses, such as occur in the violent convulsions of

epilepsy, these bodies break down into very fine granules, but are restored by rest.

*Intellectual Fatigue.*—Here waste products act on the brain cells, and we have in brief what is known as “*mental tire*” or “*brain fag*.” Each individual reacts differently to the fatigue products, just as an individual

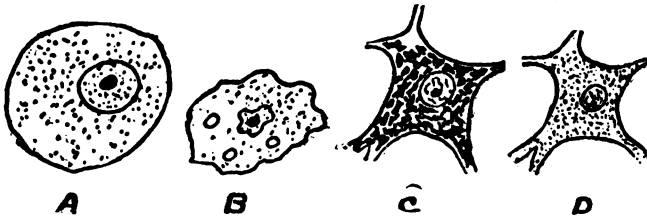


FIG. 3—(A) Normal cell. (B) Fatigued cell. (C) Cell with Nissl bodies. (D) Cell with Nissl bodies broken down into fine granules. (After Flint.)

may display his idiosyncrasy to certain poisons. It is likewise true that individual tissues manifest a decided difference in reaction to fatigue products. There are individuals who can do a prodigious amount of physical work, yet who are incapable of performing minor cerebral tasks without suffering from headache, heaviness of the head, and other signs of brain strain. Haller<sup>14</sup> regards study as akin to love, both of which stimulate the circulation and perspiration. Walking to many is equivalent to mental gymnastics. Rousseau said that “walking has something which animates and vivifies my ideas,” and Plato said, of exercise, that it would almost cure a guilty conscience. Emerson said, “Few men know how to take a walk—the qualifications are

endurance, plain clothes, old shoes, an eye for nature, good humor, vast curiosity, good speech, good silence, and nothing too much." In his book on "Fear," Mosso shows that fatigue weakens the pulse, while the head becomes hot and the feet cold, and some individuals experience a buzzing in the ears. Gley<sup>15</sup> observes that intense intellectual labor causes a rise in the temperature of the body. Fever is now understood to be increased heat production without corresponding heat dissipation—it is essentially a disturbance of the thermic balance. *Sabüral fever*, which resembles typhoid fever, is dependent on a condition of self-poisoning. After overwork, emotion, etc., nausea, vomiting, chills, and headache occur. *Palpitation of the heart* is likewise a symptom of intellectual fatigue, and so is irregularity and increased rapidity of the heart's action. Mosso<sup>16</sup> experienced these heart sensations. He says that "quite suddenly one feels short of breath—the heart beats more rapidly, and it is difficult to count the number of pulsations." Sir Walter Scott experienced a "fluttering of the heart," which he called the *morbus eruditorum*, and informs us that in his youth it often threw him into "an involuntary passion of ceaseless tears." "I know," he says, "it is nothing organic, and that it is entirely nervous; but the sickening effects of it are dispiriting to a degree." Charles Darwin found that inordinate intellectual work would produce vertigo. Brain workers frequently complain of digestive disturbances, and Tissot remarked "he who thinks most is he who digests worst." Hallucinations are frequently experienced by brain workers. The spontane-

ous and involuntary power of creating images which are accepted as realities is known as fantasy. Many intellectual workers often experience such phantasms just before going to sleep, in the twilight of the minds. The writer frequently experiences *visionary phantasms* just before going to sleep, especially after exhaustive study at night. Shakespeare in the dagger scene of "Macbeth" described such visions:

"A dagger of the mind, a false creation,  
Proceeding from the heat-oppressed brain."

Phantasms are modified by certain conditions: when emotion is active they are sentimental, when will is dominant they become actions, and when reason prevails they become argumentative. Alfred Maury speaks of such hallucinations as *hypnagogic*. They frequently occurred to him, especially after difficult work in the evening. Once he spent two consecutive days in translating a difficult Greek passage, when he saw, before falling asleep, numerous images which followed each other so rapidly that he sat up in bed in actual fear, for the purpose of dispelling them. These predormant impressions are not dreams, and are not always made up of unpleasant hallucinations. In investigating this subject among brain workers, I find that many enjoy the visionary impressions, which include beautiful coloring, landscapes, picturesque cities, etc. In *brain fatigue* psychic often precede all other gross symptoms of fatigue. The mental traits last acquired—morality, will, and attention—become abeyant, and the traits first acquired in mental development obtrude themselves on

consciousness. The *neurasthenic* furnishes a typical example of what brain fatigue can do with an individual. First, the capacity for mental work becomes diminished, and any mental effort is attended by a sense of fatigue and distress. The loss of memory is only apparent because the individual lacks the ability to fix the attention or concentrate the mind. *Attention* is the essential element of mental life. Darwin relates in his "Descent of Man" that it is impossible to make anything out of a young monkey if his attention can easily be diverted. There is inability to originate ideas or to think intelligently or connectedly. *Fixed ideas* become dominant, *i. e.*, attention becomes so firmly fixed to a single thought that all others which do not harmonize with it are eliminated from consciousness. There are individuals whose apparently sole affliction is some morbid idea. I have coined the word *ideopath* to designate the individual in question. The ideopath is by no means a rarity. His idea reacts on the feelings and becomes a source of acute suffering. Macbeth suffered acutely from an idea, when he asks the physician whether he could

"Pluck from the memory a rooted sorrow,  
Raze out the written troubles of the brain."

Much of the mind's activity is *suggested thought*, or unconscious thinking, which is uncontrolled by the will. Thought, like force, pursues the path of least resistance, and with the repetition of thought a habit is engendered which eventually so masters the mind that the idea becomes pathologic and is



awakened into activity by the most trivial suggestions. The ideopath is always on the alert for such suggestions—an incautious remark of a friend, a newspaper article, in fact, anything supplies him with pabulum to nourish his fictitious idea. Anomalous ideas are often created from long-forgotten images and events which remain latent, and are called into activity by some profound emotion or suggestion. External stimulation of some sense organ may actuate a morbid idea when conceived by an astigmatic brain. Gould and Pyle<sup>17</sup> instance a case which appeared under the title, "A Modern Pygmalion." It was the history of a man who died in an insane asylum. He was an exhibitor of waxworks, and became deeply impressed with the beautiful proportions of the statue of a girl in his collection and, like Pygmalion, became intensely enamored with her. He spent hours in adoring the inanimate object of his affections and finally believed that the movements of the figure demonstrated response to his devotions. His wife in a fit of jealousy destroyed the wax figure, and for five years thereafter he lived under the influence of his lost love.

*Morbid Fears.*—These are characteristic of nerve exhaustion, for fear and weakness are associated conditions. Conscious strength is tantamount to courage, weakness to fear. A neurasthenic recognizes the absurdity of his fears, and may be able to dispel them. Not infrequently the *phobias* persist as fixed ideas after the neurasthenia is cured. Fears are common among intellectual neurasthenics, and are often associ-

ated with indecision, doubt, eccentricity, vertigo, diminished affection for those dear to them, obsessions, etc. Patients with phobias may show only mental distress, others suffer from heart palpitation, sudden muscular weakness, pallor, perspiration, or may even involuntarily void the contents of the bladder or the bowels.

*Aichmophobia* is the fear of any sharp-pointed instrument. James I. of England could never tolerate the appearance of a sword. *Thalassophobia* is the fear of immense spaces. The moralist Nicole was forced to close his eyes when viewing a large expanse of water, and he was seized with tremor. *Agoraphobia* is the fear of an open space, and agoraphobes dread crossing the street. In *acrophobia* the individual fears high buildings. In *claustrophobia* fear is expressed for narrow spaces. *Mysophobia* is fear of defilement. The subjects are always worried lest their clothing, the toilet, or eating utensils may communicate infection. In *hematophobia* there is horror of blood, an instinctive feeling among the civilized, but unknown among savages. A sect known as the Moravian Brothers had such an intense horror of bloodshed that they executed their condemned brethren by tickling them to death. The fear of people or society is known as *anthropophobia*, while the antithetic condition, the fear of being alone, is called *monophobia*. In *bacillophobia* there is a constant dread of germs. In *kleptophobia* there is a fear of taking certain articles exposed to view. Some specially fear syphilis (*sypholophobia*), others, certain animals (*zoöphobia*), etc.

Some individuals, fearing to rise or walk, pass all their time in bed (*stasophobia*.) There is a condition of morbid doubt about everything done (*folie de doute*), and the individual may close a door a number of times and may even then be in doubt that he has closed it: he may get out of bed repeatedly, uncertain whether he has turned off the gas. Worry over the possibility of disease is known as *nosophobia*. Instances of particular aversions are likewise chronicled in the literature.

*Necrophobia*, or the fear of death, often assumes the magnitude of a monomaniacal besetment. Corning<sup>108</sup> has described his disciplinary method for the cure of this obsession. He instructs his patient to diminish the terror of death by thinking of sleep as death—not of death as sleep. That he must habituate himself to this idea by saying to himself when about to sleep, “I die now.” Thus through auto-suggestion he is made to feel that he already knew the worst that death could inflict him, and that unconsciousness is the greatest of all boons. Again, he tries having an attendant keep the patient awake to convince the latter that the pangs of a consciousness unduly prolonged is the most convincing testimony to the supreme benevolence of death. S. Weir Mitchell<sup>109</sup> has recently analyzed “*cat fear*.” Certain persons on seeing a cat experience various sensations, notably oppression of breathing (*cat asthma*). Cat emanations affect the nervous system through the nose, although unrecognized as odorous.

*Obsessions*.—These are spontaneous positive sub-

conscious impulsions which obtrude themselves unbidden on consciousness and compel recognition against every possible effort of the will. They are made up of *imperative conceptions* and *morbid impulses*. The former refer to ideas which the individual may recognize as absurd, but which nevertheless occur to him and dominate his thoughts and often direct his actions. When such conceptions prompt him to commit an act, they are morbid impulses. The impulse may be harmless and may consist of a repetition of words or phrases, a desire to touch certain objects, to count, and in more dangerous cases to commit homicide or suicide. The feeble inhibition and exercise of the will, such as is characteristic of childhood, may give birth to imperative conceptions; but as the child matures impulsive action yields to judgment.

*Morbid Introspection.*—Looking inward into one's self is introspection. When we watch a mental process we introspect, and we introduce into such an observation a new element, which conflicts with that which we are watching. Persistent occupation with the phenomena of self is always achieved at the expense of less selfish interests, and eventually develops exaggerated idea impressions centered on consciousness. An individual of this kind may be called, an *Egopath*. He suffers from the inability to forget himself. Consciousness thus contracted becomes morbid. Morbid introspection is an early sign of nerve exhaustion, for the mechanism involved in conscious attention is easily tired. The neuron groups show

lowered resistance, and they become hypersensitive, and this hypersensitiveness, obtruding itself on consciousness, only increases their sensitiveness. Morbid introspection induces the patient to analyze his symptoms, to be on the alert for new ones, and to be sensitively conscious of his ailment.

*Laws of Fatigue.*—All work is the translation of chemical force. Moderate methodical work increases the development of the tissue cells, but if excessive or irregular, it leads to waste and degeneration of the latter. Every function of the body is controlled and operated by the nervous system. The latter, which dominates the mind, also controls the action of the muscles. The time during which an individual can sustain a voluntary muscle contraction is determined by the endurance of the brain centers engaged in the act of volition, rather than by that of the muscles themselves. The very moment these centers are exhausted the muscle contraction gives way. Volition can be fatigued when exerted in imagination as well as in actual muscle effort. Thus fatigue is a central, not a peripheral condition. We have not two nervous systems, nor two brains, and it is this mistaken conception of the functions of the nervous system which has made confirmed neurasthenics out of individuals who have expended too much nerve force in excessive muscular development under the supposition that they were developing their minds. If the theory of muscularity were correct, intellectual giants would be recruited from dray horses and pugilists. All mental fatigue diminishes the capacity for muscular work,

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and, conversely, muscle fatigue lessens the capacity for mental work. It is ridiculous to assume, as some do, that the body has many sources of energy which can be drawn upon independently of one another. Thus, they assume that in physical work all energy is drawn from the muscles, leaving the specific energy of the brain unmolested. Intellectual and emotional activity produce the greatest degree of fatigue.

*Minor Insanity and the Passing of Neurasthenia.*—Dana,<sup>18</sup> and, more recently, Norbury,<sup>19</sup> assign a very large percentage of cases now designated as neurasthenia (our great national disease) to the group of psychoses (*neuro-psychoses* or *psycho-neuroses*); in other words, they study many cases of neurasthenia as mental disorders. It is undoubtedly true that there are morbid states of the mind, as evidenced by morbid fears, imperative conceptions, emotional disturbances, introspection and diminished will power, which react upon body and mind which are in nowise related to the classical type of neurasthenia, the chief symptom of which is *tire*, and without which the disease cannot be said to exist. Yet no one can deny that mental disorders co-exist with neurasthenia, which have been grouped by Savill<sup>20</sup> under the designation: *neurasthenic insanity*. Such cases of borderline insanity differ from true insanity in the following respects:

1. Marked bodily weakness precedes and accompanies the disorder.
2. The condition is curable by appropriate measures after a duration of a few weeks or months.
3. The most prominent feature of the mental condi-

tion is mental weakness. Delusions and hallucinations are absent as a rule.

4. It is difficult to make it correspond with any of the types of insanity found in asylums.

5. The mental symptoms vary from day to day, and lucid intervals occur from time to time, during which a casual observer might find nothing wrong with them.

6. There is no family history of insanity.

There is ample reason to believe that morbid fears and other atypic manifestations of minor insanity do not always belong to cerebral neurasthenia, for their persistence after evident cure of nerve exhaustion countenances this view. To totally ignore their neurasthenic origin is equally wrong, for I have frequently observed, after a rest cure, the permanent evanescence of mental symptoms which primarily impressed me as being in no way related to neurasthenia. It is also true that a rest cure is an aggregation of cures: a water, diet, exercise, and a mind cure, and for this reason a rest cure cannot be regarded as an absolute diagnostic aid in relegating certain mental symptoms to a definite nosology.

One can say, however, that when psychic disturbances are associated with mental exhaustion, diminished capacity for sustained intellectual effort, and inability to concentrate the attention, they are most likely dependent on neurasthenia. *Self-poisoning* as a factor in the causation of insanity is receiving the consideration it truly deserves. Obstinate constipation has been followed by acute insanity, and the con-

dition was recognized by the presence in the urine of the products of intestinal putrefaction. The correction of faulty digestion or constipation has frequently been the means of restoring disturbed mentalization. In *uremia* and *diabetes* we encounter mental states which are practically insanities dependent on the presence of poisonous substances in the blood. At the time of writing, I am in attendance on a case of *phthisical insanity*. The patient only developed mental symptoms when she was no longer able by excessive weakness to expel her sputum. I have noted many instances of this kind, and I have attributed them in the main to the absorption of poisons manufactured by the retained sputum.

*The Identity of Functional Nervous Diseases.*—The efforts of Dana and others to relegate neurasthenia to its proper place is commendable, but we have not gone far enough in our pursuit of abridgment. If we bear in mind that the typic signs of neurasthenia are essentially fatigue symptoms—irritable exhaustion of the mind and body, including the senses and viscera—many neuroses may be included and others excluded from the designation neurasthenia. Affections allied to neurasthenia, and referred to by Dercum as the *neurasthenoid states*, is no compromise to a solution of the problem. A nervous affection is or it is not neurasthenia. In most functional nervous diseases ideas control the body and produce morbid changes in its functions. The diagnosis of cause rather than the diagnosis of effect,—the disease,—while of less scientific, is certainly of greater practical,



importance. To study an unhealthy mind we must approach it by a correct study of the body, for a healthy mind without a healthy body is inconceivable. Diseases are so closely related that the physician is constrained to admit that they are often a posy of flowers modified only by the mental soil from which they were gathered.

## IV

# THE TOXICOLOGY OF THE EMOTIONS AND SLEEP

## THE PSYCHOLOGY OF EMOTION—OBJECTIVE DEMONSTRATION OF EMOTION—THE TOXICOLOGY OF SLEEP

*The Psychology of Emotion.*—Emotion is a state of feeling—fear, grief, anger, joy—which is initiated like a brain storm, and in its tumultuous force creates energetic disturbance of the entire organism. The emotions are physiologically manifested by:

1. *Muscular expression.*
2. *Bodily expression.*

Darwin<sup>21</sup> refers to the exhilarating emotions which raise the eyebrows, eyelids, nostrils, and angles of the mouth, whereas the reverse effect is manifested in depressing passions. In grief the inner ends of the eyebrows are raised, the forehead is wrinkled, and the corners of the mouth drawn down. Joy finds expression by the drawing of the corners of the mouth backward and upward, while elevation of the upper lip and the nostrils express contempt. A skilled physiognomist can readily diagnose the admiration of one for another by noting the raised eyebrows, the glistening eye, the relaxed expression, and very often a gentle smile that plays about the mouth. Definite muscular movements will arouse definite emotions,

and this fact is appreciated in histrionics. When the actor assumes a defiant manner, clenches his fist and raises his voice, or when he simulates laughter, he actually feels that he is either angry or cheerful. Someone has said that he cannot walk with a girl's mincing step and assume her manner without feeling frivolous. In the form of suggestion referred to by the French as *suggestion par attitude*, the different attitudes of the body will awaken corresponding ideas, moods, and motions. If the hypnotized subject is placed in the attitude of prayer, without uttering a word, the position itself creates the idea of prayer, and the facial expression demonstrates that the subject is thinking only of prayer. Similarly, if a pen is placed in the hand the subject will write; if fancy work and needle and thread are placed in a woman's hand she will sew; if the fist is clenched, the eyebrows contract and anger is expressed in the face.

The secretions are controlled by mental influences. The urine may be increased in quantity, or oxalates and phosphates in excess may appear. An examination of the heart of excited individuals often reveals *systolic murmurs*, which disappear later when the nervous equilibrium is re-established; and it is for this reason that in nervous individuals I never formulate a conclusion respecting the condition of the heart until the patient is quieted after several days' absolute rest in bed. Students expecting an examination may have temporary traces of albumin in the urine. Minor expressions of emotions are "chills up and down the back," blushing, pallor, "creepings of the blood," etc.

Nervousness will parch the lips and fear may cause diarrhea. Professor Elmer Gates<sup>22</sup> has shown that when the breath of a patient was passed through a tube cooled with ice so as to condense the volatile qualities of the respiration, the *iodide of rhodopsin*, mingled with these condensed products, produced no demonstrable precipitate. Within five minutes after the patient became angry, however, a brownish precipitate occurred; which he concluded indicated the presence of a chemical compound produced by the emotion. This compound when extracted and administered to men and animals is said to have caused stimulation and excitement. Extreme sorrow caused a gray, and remorse a pink, precipitate. Combe<sup>23</sup> and others cite numerous instances where the mammary secretions in consequence of violent mental excitement acquired a toxic character. A child which was never ill was given the breast by a mother who had just recovered from a state of fright. In a few minutes the child left off suckling and sank dead upon its mother's bosom. Dr. Carpenter<sup>24</sup> cites an instance from his own practice. A mother who had just heard of the sudden death of the child of an intimate friend took up her own child and nursed it. Immediately after the child expired in convulsions. The celebrated John Hunter, who suffered from heart disease, said that his life was at the mercy of any scoundrel who should make him angry. At a meeting he was contradicted by one of his colleagues, an attack of angina occurred, he ceased speaking, and soon fell dead in the arms of a friend.

*Objective Demonstration of Emotion.*—Consciousness, whether of sensation, feeling, or idea, is always expressed in open or concealed emotion. Evidence of the foregoing fact is furnished by blood-pressure, heart and lung examinations. Emotional influences will cause immediate changes in the blood-pressure. In emotions of depression the blood-pressure may suddenly fall or rise when the emotion is one of exaltation. I have shown elsewhere<sup>25</sup> the influence of the vasomotor factor in blood-pressure. The writer wishes to emphasize the importance of high blood-pressure in inducing *arterial degeneration*.

Longevity is a question of vascular health, and a man is only as old as his arteries. Death in a large number of instances is caused by arterial degeneration. The conviction is rapidly gaining ground that the poisons absorbed from the intestinal canal are largely responsible for degenerative arterial changes. Heubner and others contend that syphilis is not responsible for such degenerative changes, although this is the generally accepted view. Individuals showing high blood-pressure dependent on *auto-poisoning* show in the urine products of the intestinal contents (indican), and calcium oxalate and uric acid, which indicate suboxidation.

*Blushing* is a vasomotor phenomenon, but it is only one of a list of concomitant conditions allied with emotion. Partridge<sup>26</sup> after a study of 120 cases noted the following chief general symptoms of blushing: tremors near the waist, trembling, warmth, weakness in the limbs, stoppage and rapid beating of the

heart, dizziness, tingling of toes and fingers, smarting of eyes, singing of ears, pressure inside of head, etc. Melinand<sup>27</sup> shows that blushing is always associated with fear. Blushing can be inhibited. It is well known that darkness inhibits modesty. Thus naturally shy persons do not suffer in the presence of the blind, and persons wearing glasses feel less shy without than with them. The most reserved Turkish woman, as de Bonneval assured Casanova, only carries her modesty in her face, and as soon as her veil is on she is sure that she will never blush at anything. How the mind controls the vasomotor system is illustrated by many investigations during hypnotic sleep. One instance related by Björnström,<sup>28</sup> was that of a man on whose left wrist was inscribed a letter. He was commanded to make it bleed, and soon the letter appeared red and raised and drops of blood trickled out.

*Stigmatization* among religious fanatics during the Middle Ages, when they could reproduce on themselves the wounds on the hands and feet of Jesus Christ, is easily explained not as a miracle, but as an unusual influence of the mind on the vasomotor system. Many persons can, as I have shown,<sup>29</sup> stop the action of the heart, and among Indian sorcerers the phenomenon is regarded as a marvelous feat. Its explanation is simple. In the neck runs the pneumogastric nerve, which, when stimulated, stops the heart's action. Now, when the muscles of the neck are voluntarily contracted, the neck muscles innervated by the nervous accessorius, the branches of which

run in the pneumogastric path, are irritated, and there is temporary stoppage of the heart's action. Indian sorcerers can maintain this inhibition over a long period of time, so that observers after the most careful examination cannot hear the heart beat. Féré tells of an hysterical woman who in the waking state could, by fixing her attention on any part of the body, cause tumefaction of that part. What is known in the literature as the *heart reflex of Abrams* is a contraction of the heart muscle dissociated with its normal contraction, and produced in various ways. Physicians have always recognized the effects of emotions on the heart, but no tangible evidence of such effects has been forthcoming. The epigram of Peter is worth repetition: "The physical heart is the counterpart of a moral heart." The conventional expression of the frightened individual, "My heart is in my mouth," finds justification by a Röntgen ray study of the heart. Tell the patient standing before the rays that you are going to burn him with a hot iron, and the effect on the heart is at once manifest. It is a veritable *psychic heart reflex* implicating the entire heart. The latter becomes at once very much reduced in size, and appears as if it were retreating toward the neck. I know of no irritation, cutaneous or otherwise, that is so pronounced as is this psychic factor of fright in inducing the heart reflex.

The foregoing fact is of the utmost importance in eliminating emotional influences in the treatment of cardiac diseases. Even in an ordinary Röntgen ray examination of the heart one may observe in nervous

patients a retraction of the heart mass. Mr. Bezley Thorne<sup>31</sup> noted that the heart shrank after exposure to the Röntgen rays. It is evident that the shrinkage thus observed was naught else but cardiac reaction to emotional influences, for a Röntgen ray examination to the average patient is a momentous procedure. I have frequently witnessed the *pulmonary reaction of fright*; the lungs become hyper-resonant on percussion and the superficial areas of cardiac, hepatic, and splenic dullness become diminished (*psychic lung reflex of dilatation*).

In the foregoing citations the visceral manifestations are the result of acute emotions, but there are also *chronic emotions* which give rise to permanent sensations. Thus the "*gone feeling*," or "*sinking sensation*," which many people feel in the upper abdominal region is caused by the *psychic heart reflex*, as I have assured myself by repeated examinations. A healthy man is not subjectively conscious that he has a heart, yet when that organ recedes from its usual position the fact that something is missing obtrudes itself on his consciousness.

*The Toxicology of Sleep.*—There are many theories of sleep, the most prominent of which is the *anæmic theory*, which assumes that the brain in sleep is comparatively bloodless. Durham's experiments show that the amount of blood in the stomach and extremities is augmented during sleep, and further, that whatever determines an increased flow of blood to the brain tends to increase wakefulness; and, conversely, whatever diminishes the activity of the cerebral circulation



tends to produce sleep. Brain anæmia is only a condition incident to sleep, and the real cause is probably the anæsthetic effects of fatigue products contained in the blood on the brain.\*

*Nitro-glycerine* causes brain hyperæmia, yet despite the anæmic theory of sleep I have used this drug with benefit in some cases of persistent insomnia. It is possible that the action of the drug in question can be explained by supposing that it washes into the blood stream fatigue products which have accumulated in certain parts of the body. It is not unlikely that the utilitarian may yet avail himself of this toxic theory of sleep by abstracting the toxic products from the blood of animals deprived of sleep by artificial means, and so concentrating them that they can be employed in insomnia. Hibernating animals suggest themselves as specially available for such research work.

My theory of wakefulness suggests that cellular activity also produces substances which neutralize the fatigue products, and in this antagonism periods of repose alternate with wakefulness, according to the rhythmical laws of physiology. Hypnotics probably owe their action to their inhibitory influence on the cells concerned in the creation of neutralizing products; and for this reason I do not regard it as chimerical to anticipate that from the blood of narcotized animals such products may be abstracted to be used

\*Overton's recent studies concerning the action of narcotics show that they are dependent on chemic and in part on physical conditions of the cells. The richer a cell variety is in contained fats, the more narcotic will it absorb.

for obtaining a natural hypnotic. Weichardt of Berlin has recently<sup>94</sup> been conducting investigations on the same anticipated lines. He has obtained from exhausted animals fatigue poisons. He shows that simultaneous with the production of the latter, *anti-fatigue poisons* are produced. He separated by dialysis a specific toxin from the other chemic products of fatigued muscles. This toxin injected into animals produced fatigue, and in large doses reduction of temperature and drowsiness. He has obtained from animals anti-fatigue toxins, and suggests their employment in various kinds of exhaustion. The toxic theory of sleep finds ample evidence for its corroboration in pathology. In *uræmia* the drowsiness is unquestionably due to the retention of some poison. In *jaundice* the reabsorption of the bile causes toxæmia. Drowsiness after a heavy meal is no doubt a toxæmia resulting from the absorption of an excess of the products of digestion. The coma of *diabetes* is due to the accumulation in the blood of oxybutyric acid, a decomposition product from disintegrated tissue albumins. In *obesity* the drowsiness can be explained by an excess of the products of abnormal digestion.

## V

### CHEMISTRY AND PHYSICS OF THOUGHT

THOUGHT AND MEMORY—CHANGEABLENESS OF THE  
EMOTIONS—THE PSYCHOLOGY OF THE PATIENT—  
THE CHEMISTRY OF DREAMS—DREAMS AS SUG-  
GESTIONS—THE PHYSICS OF THOUGHT—THE  
PHYSICO-CHEMISTRY OF CURES—FAITH CURES  
AND SCIENCE

*Thought and Memory.*—It is impossible to dissociate psychic functions from the phenomena of nutrition. If we admit that mental phenomena can be included within the domain of science, we are constrained to conclude that the phenomena in question are subject to the laws of nature and may be submitted to nature's laws for analysis. I employ the word *thought* to designate mental activity of any kind. Any mental operation necessitates the employment of *memory*. It was at one time believed that memory was dependent on the distribution of air in our bodies, and that its even distribution made us remember and its uneven distribution made us forget. Plato regarded mind as a mass of wax of varying degrees of purity, which received and fixed the impressions. Aristotle taught that perception was dependent on movement in a sense organ conveyed by means of the

spirit in the blood, and the movement persisted after the stimulus that had provoked it ceased to act.

We now regard memory as a physical condition, associated with definite brain areas. If the brain area connected with the memory of sound is injured or destroyed, the memory of sounds will be impaired or lost. Similarly, if the posterior portion of the brain is extirpated in a dog, he can see nothing, and has in fact lost all memory for whatever he has seen. He can exercise all other senses as well as he ever did before. If a small portion of the brain of the dog concerned in sight memories is allowed to remain, the animal may form new memories as a result of further development. Similar experiments have been made with the brain centers concerned in taste, touch, and smell, with like results. In disease, if any of the foregoing brain areas are put out of function, results similar to those observed in the experimented animal are noted. Professor Paulsen, referring to the *physical retention theory*, says, "Ideas do not exist in the brain; one might just as well say they are in the stomach or in the moon. . . . If an idea exists at all, it exists in the mind. It goes out of existence on leaving consciousness. Its appropriate brain cell treasures up the possibility of its return, but it will not come again into existence until it is re-created in just the same way as it was originally perceived. Every organ—indeed every cerebral area and every psychic nerve cell—has its memory." Most psychologists agree that there is both a physical and mental side to memory, but to memory must also be added a chemical side.

Experiments show that chemical processes are more active in the brain than in the muscles. That thought is frequently stimulated by chemical action is instanced by analogy. We need only cite the effects of such well-known substances as alcohol, chloroform, opium, and cannabis indica. Alcohol primarily stimulates the brain, increasing the rapidity, but not the depth, of thought. Taken in large quantities at one time, alcohol inhibits thought and produces an acute hallucinatory excitement. It has been estimated that about ten per cent. of all cases in an insane asylum are caused by alcoholism.

Among other chemical substances that produce the hallucinatory type of insanity may be mentioned chloroform, morphin, atropin, cocain, etc. Each poison acts differently in different persons. What opium has done for literature the writings of the self-confessed opium-eater, De Quincey, are pertinent. His articles are of the most bizarre nature, yet they are prose poems which are marvels in imaginative grandeur and the most wonderful creations of their kind in English literature. Witness the effect on thought of cannabis indica, or Indian hemp. Taken in sufficient dosage, ideas follow each other so rapidly as to create a sense of prolongation of time, so that seconds seem minutes, and minutes days. The traits peculiar to the individual are exalted, the sexual and other senses are exaggerated, and the subject feels as though he had attained enormous dimensions. Thus we could proceed almost indefinitely to show how drugs can influence thought. In the body putre-

factive alkaloids are manufactured which can duplicate the physiologic action of many of our well-known drugs. Such alkaloids are mainly derived from ingested foods. Thus a conium-like substance was found by Brouardel in the body of a woman after eating of a stuffed goose. Wolckenhaar obtained a nicotin-like substance from the decomposed intestines of a woman. Strychnin- and morphin-like substances have also been obtained from the brain of a man. Trottarvelli found a digitalin-like substance, and other observers have extracted from the body veratrin and colchicin substances. Verily, there is much truth in the aphorism, "Tell me what a man eats and I'll tell you what he is"; and I may add, with abject apology for the transposition, "As he thinketh in his stomach or intestines, so is he." The neoplatonist, Porphyry, wrote: "It is not among the eaters of simple vegetable foods, but among the eaters of flesh that one meets assassins, tyrants and robbers."

*Changeableness of the Emotions.*—An idea is so associated with emotion that no absorbing idea can be entertained without a change of the entire body to harmonize with it. The sense of fear causes the hair to stand on end; it increases the secretion of the skin so that we perspire; it inhibits the secretion of the salivary glands, and the mouth becomes dry; it increases the secretions of the alimentary canal, kidneys, etc. Fear often checks the flow of saliva. In India the native judge orders a suspected criminal to chew rice for five minutes. If after this time the mouth is dry, the suspected one is declared guilty. As a rule

this is found to be an efficient method, insomuch as the culprit's fear of detection inhibits the action of the salivary glands. Our emotions are not always the same; in the morning we may be cheerful, at night depressed. In a thousand ways without accountable reason are we the creatures of moods. A close observer said that he had a different opinion when lying down from what he had when standing. Even the normal state of health is never represented by a straight line, and Holmes, in "Over the Teacups," speaks of this rhythmic undulation in the flow of the vital force in raising or depressing the standard of vitality. All feeling is necessarily mental, yet there are physical feelings originating from sensations derived from the tissues and organs of the body. Consciousness of our corporeal functions is one of the best evidences of disease.

A healthy man is not subjectively conscious that he has a stomach, or, for that matter, any other organ. Let him once direct his attention to an organ and he will soon suffer from functional disturbances pertaining to that organ. In health the sensory nerves of the organs are endowed with a low degree of sensibility. The stomach and all of the intestines excepting the lower end of the rectum can be cut or even burned without resulting sensation. The same can be said of the other organs, including the brain. Temperament is a question of digestion, and many philanthropic acts have been forever lost in a disordered liver. The epigrammatist who said to be happy one must have a bad heart and a good stomach, aimed

indirectly at the truth in ascribing our feeling of well-being to a perfect condition of the digestive apparatus. If the truth were told, the pessimist and optimist and the creators of philosophic systems and religions would be compelled to acknowledge the influence of their temperamental state for their mental creations. Saint Pierre found in the feelings of melancholy the most voluptuous of all sensations, and Marie Bashkirtseff said that she enjoyed weeping and despair. Professor Ribot<sup>34</sup> coined the word *Anhedonia*, to designate a condition of indifference in which the individual has lost the sense of emotional reaction. He instances this condition in a young girl, afflicted with a disease of the liver, who suddenly lost all affection for her parents. Esquirol<sup>34</sup> also relates the case of an intelligent magistrate who was a prey to hepatic disease, in whom every emotion within him appeared dead. The thought of his home, wife, and children influenced him as little as a theorem of Euclid.

*The Psychology of the Patient.*—One must not stake anything on the mental status of the average patient: the vagaries of the mind are manifold, incessant, and vacillating; one moment it views you as a guardian angel, only to regard you the next minute as a fiend incarnate. In the presence of his patient the physician is compelled to rise above the melancholy of his environment. The average patient is not so much concerned about what he has as by what he thinks he has. The witty paradox of Moxon is apposite: "It is quite as important to know what kind of a patient the disease has got, as to know what sort of disease the



patient has got." Disease is demoralizing, and merits the Johnsonese observation, "Every man is a rascal as soon as he is sick." Louis XIV. suffered from a fistula, and his reign was said to have been divided into two parts—that before and that after the fistula.

The psychological phenomena of disease are varied. They are dependent on disturbed nutrition of the higher cerebral centers and on the action of toxins on the neurons. Such action is modified by the mental, moral, and physical organization of the individual. The action of toxins in disease has been appositely compared to the effects of alcohol. Chemically, the action of alcohol on the nerve cells is always the same, but the individual's temperament, resistance, and moral status must be considered. Thus the picture of mental reaction to alcohol is varied; some become morose and inactive, others excited and quarrelsome, and others show an exalted state of well-being. Loss of *self-control* is a conspicuous psychologic phenomenon in disease. Self-control, which includes will and judgment, is a phenomenon of the higher mind, and the latter first suffers in disease, insomuch as in the evolution of the mind it is the last to develop. According to a biologic law, the nerve centers which develop late are the least organized and most susceptible to morbid influences. When will and judgment are suspended in a patient, inhibition of the lower instincts is lost, and a mental condition made up of selfishness, introspection, suspicion, and irritability is engendered. "No one," avers Lavénge, "can be a hypochondriac at pleasure"; for no one willingly

throws himself into the slough of despond. Schofield<sup>35</sup> tells of a physician who once said to him: "If a man is so ill as to say he is ill when he is not ill, he must be very ill indeed." The mental state of some patients is buoyant and optimistic, or varied with periods of depression. The varying clinical picture may be referred to the idiosyncrasy of the patient in his reaction toward the poisons. As a varied mental picture of poisoning, *general paresis* may be cited. The patient is irritable, fretful, and annoyed by trivial things; later in the disease there is mental exaltation, and the patient is cheerful, confident, and imagines himself possessed of great wealth and power. Even this state of exaltation may be broken by outbursts of violence. The observation of the older clinicians still bears the imprint of truth, *viz.*, that the mental condition of patients is more cheerful in diseases above than below the diaphragm.

Nearly every gland of the body with or without ducts has an *internal secretion*. The internal secretion of the *thyroid tissues* has been best studied. The removal of the thyroids leads to pronounced disturbances of nutrition, and when atrophied or altered in function cretinism and myxœdema may follow—which are at once corrected by feeding the patient with thyroid tissue. The *adrenal bodies*, if removed, cause great muscular weakness and loss of vascular tone. If the *pituitary body* is removed, symptoms similar to those following removal of the thyroid tissue develop. We all know that the internal secretion of the *pancreas* affects the sugar consumption of the

body. The *testes* likewise furnish an internal secretion which probably acts as a regulator of sexual desire. In the case of the *ovaries*, we know that their removal causes nervousness, flushes, etc., and that many nervous symptoms in women, at a time when the ovaries are no longer active, can be mitigated by the administration of ovarian extract. In *pregnancy* many of the disorders are probably due to a poisoning of the organism owing to the increased work performed by the organs of the body. Symptoms thus arising indicate that the organs of defense, notably the liver and kidneys, prove inadequate. Thus the vomiting, salivation, insomnia, etc., often present in pregnancy may be referred to auto-intoxication.

*The Chemistry of Dreams.*—Whereas in deep sleep consciousness appears to be in abeyance, in less profound sleep states mental processes are actuated, consciousnesses are generated, and the brain communicates with the outside world—in other words, we dream. Our most vivid dreams occur prior to sleep or just before waking. Dreams are the product of stimulation of some sense organ. When the eye, ear, or an internal organ has been stimulated, the brain in accordance with the law of habit proceeds to work somewhat like in the waking state, but in the dream state, dream ideas are incongruous, fantastic, and disorderly because the associated ideas have no guiding purpose, and there is no voluntary control over the current of thought. Dreams are accepted as real because there is absolute loss of attention during sleep and ideas run rampant because attention is not selective. Imagina-

tion and reason are usually abeyant during dreams, and this is evident when we recall that imagination can only create its ideals in wakefulness and reason only concerns itself with orderly thoughts. "Kubla Khan" and Tartini's "Devil's Sonata" were composed in the dream state. According to the sense stimulated, so we dream; thus one may dream in visions, sounds, or in temperatures if the skin is stimulated. Dreams are often referred to as visions, insomuch as vision plays so important a part in our psychic life. Aristotle contended that in waking life we have a world in common, but in dreams each has a world of his own. Dreams are only created from past experiences. A blind person never dreams of seeing; a congenital deaf one, of hearing.

Aristotle claimed that one could be made to dream of thunder storms by making a slight noise in the ear of the sleeper. Dr. Maury directed his assistant to tickle his lips when asleep, and the doctor dreamed of suffering horrible facial tortures. Notwithstanding all the precautions taken to induce profound sleep, and thus avoid dreaming, unavoidable conditions always arise, like variations of temperature, pressure of the eyelids, the flow of blood in the vessels contiguous to the ears, etc. A characteristic of the mind in sleep is the annihilation of time and space, all the events of a lifetime passing in review in a few minutes. The average person recognizes the unconscious influence which dreams exert on his well-being: whereas many do not remember their dreams, there are others who find the phantasms of the night ob-

truding on their waking life. Auto-suggestion thus evoked gives rise to untold agony, and the unfortunate one is pursued for months or even years by the phantasms of dreamland. I have known many neurasthenics whose morbid fears originated from dreams, and all that was necessary to construe the grotesque phantasms as reality was a jaded brain. De Quincey compared the brain to an antique vellum parchment—a palimpsest, whereon successive generations recorded their historic events or the creations of fancy; the legatee erasing, as he vainly thought, the previously written narrative to make room for his own. Thus the brain receives many layers of ideas which enter unperceived into the very substance, there subsiding into a latent state until aroused by molecular excitement of the gray centers.

In this sense O'Dea compares the brain to a palimpsest. Sleep intensifies imagination and converts the brain into a susceptible organ of suggestion, for then reason and judgment, which inhibit brain automatism, are no longer in command and the idea accepted as real is converted into action (ideomotor action). Tuke cites the instance of a girl who desired to use rhubarb on the following day, which she disliked; that night she dreamed she had taken it, and on the following day had a number of evacuations. Demangeon tells of a monk who desired to purge himself on a certain morning. On the previous night he dreamed he had taken the medicine and, awaking, found that he was compelled to evacuate his bowels a number of times.

Dr. J. M. Buckley relates the following case: A

student nineteen years of age was very fond of a teacher who died. Later the young man dreamed that the teacher informed him that he would die on a certain day and hour. He communicated his dream to others, and was convinced of its reality. His family regarded the dream as a delusion, and noting no change in his health, were not worried. When the day arrived he ate a hearty meal and was cheerful. Later he went to his room, lay down, and died without a struggle. Like nightmare, dreams are frequently associated with some digestive disturbance, and the toxic substances present in the blood stimulate ideas and emotions in a disconnected way because reason and judgment are suspended. Milton, referring to Adam, said, "For his sleep was very light, from pure digestion bred."

In our waking moments we often have the same toxic stimulation of thought, and we dream. I have already attempted to show that sleep in itself is a form of toxæmia. During the night renal activity is suppressed and alimentary toxins accumulate in the blood. It has been shown that the urine is more toxic at night than during the day. I have frequently witnessed in individuals who have spent a sleepless night that on the following day they often experience a feeling of repose as though they had taken an opiate. I know several individuals who experience a stimulation of the genital functions after a sleepless night. In the foregoing instances we must postulate the presence in the blood of fatigue products, which must exercise their specific chemic effects in the manner

shown. One may with propriety speak of the *chemistry of death*. Euthanasia is the usual provision made by benign Providence to fulfill the wish of the poet:

"When time, or soon or late shall bring  
The dreamless sleep that lulls the dead,  
Oblivion! may thy languid wing,  
Wave gently o'er my dying bed."

That great master-mind in medicine, Professor Osler, in a recent address on "Science and Immortality," said that he had made careful records of about five hundred death-beds, with special reference to the modes of death and the sensations of the dying. The great majority gave no sign, one way or the other: "Like their birth, their death was a sleep and a forgetting."

*The Physics of Thought*.—Many literary men develop a sort of "*work-fever*" before the brain can yield its best work. Thus the brain condition of the intellectual laborer is somewhat analogous to that occurring in fever. Some years ago,<sup>36</sup> in studying the psychology of consumptives, I noted that when the temperature was moderately high the patients experienced a sensation of well-being and ideas of an optimistic nature flowed freely; but when the fever remitted, the patient became dejected and his ideation was one of pessimism.

*Fever* is largely an affair of the nerves, and is practically a disturbance of the thermotaxic mechanism. The physiologist, Haller, observed that his thoughts flowed more freely when he was feverish,

and there is a well-known aphorism that a little fever increases the readiness of the tongue and makes the imagination more fertile. *Light*, as an agent in hastening chemical change, is everywhere witnessed in nature.

"The glorious sun  
Stays in his course, and plays the alchemist;  
Turning with splendor of his precious eye  
The meagre cloddy earth to glittering gold."

Sun-worship was always the essential factor of polytheistic religions, and of the several mythologies the chief deities were personifications of the sun or of its particular effects. While the declining sun symbolized death, the mid-day brightness was emblematic of power. Intuition taught the Incas how closely the sun was identified with life and its preservation. It is unnecessary to expatiate on the beneficial effects of sunshine upon men and animals. The solar rays increase all the functions of animal and vegetable life.

I believe I was one of the pioneers in establishing the therapeutic value of the solar rays<sup>37</sup> at a time when Finsen was accumulating evidence which later startled the scientific world.\* At that time I concluded from my investigations that the ultra-violet rays of the solar spectrum penetrate the body in like manner to the X-rays, and in this way affect nutrition. It has been

\* Kime (*Iowa Medical Journal*, April, 1900) speaking of his own work refers to Finsen, himself and myself, who working along the same lines independently, each has pursued his own original methods. "In the order of their publication, the papers were, Abrams, March, 1899, Kime, June, 1899, Finsen, September, 1899.



suggested that the curative virtue of quinin depends on its fluorescence, whereby it floods the blood with light and makes it an unsuitable habitat for the malarial organism. As long ago as 1879 it was shown<sup>75</sup> that the blood and most of the tissues are slightly fluorescent, and that in malaria this fluorescence is reduced,



FIG. 4.—Scene photographed through the body (Kime).

and is increased by taking quinin. It has even been suggested to use sun or electric light baths with quinin in the treatment of malaria.

Morton has recently availed himself of the fluorescent property of substances like æsculin, quinin, resorcin, etc., by introducing solutions of them into the body, and then exposing the particular part to the action of the X-ray or radium, which causes the sub-

stances in question to take up light and thus bathe the internal organs in liquid "*sunshine*." To demonstrate the penetrability of the solar rays, the accompanying photograph (Fig. 4) represents a scene photographed by light passing entirely through the adult chest.

Mosso declares that some writers work better in proportion as the heat and light are more intense, and Johann Müller could not think well in the dark. Goethe wrote: "The first hours in the morning I have consecrated to poetry; the day belongs to the affairs of the world." Dr. Crothers<sup>38</sup> has recently introduced the phrase "sundown journalism" to describe some of the peculiarities and eccentricities which appear in the journals and journalistic work as the result of sundown work, or work done when the brain and body are debilitated and below par from the strains and labors of the day. In such work thought is stimulated by coffee, tea, tobacco, whisky, and even morphin.

Edward G. Dexter<sup>43</sup> has essayed in his book an empirical study of the mental and physiologic effects of meteorological conditions. In a living organism a part of the available energy is necessary for the vital processes of living, while the reserve energy goes into the intellectual processes. Weather conditions play on the reserve energy by affecting oxidation, which is the chemical basis of life. Inhabitants of hot climates are apathetic and improvident. An equable, moist temperature weakens body and mind. The most favorable temperature for health, with its aggressive energy, is about 55 degrees F., and this is found in the tem-

perate zones. The dominant peoples are shown between the 25th and 55th parallels. Dexter has shown the effect of weather upon human conduct by marked fluctuations of immoral acts. We find ourselves out of sorts on hot, humid, cloudy, and perhaps rainy days. We have always known the influence weather changes play in the causation of disease, especially in the so-called *barometric neuroses*. The total atmospheric pressure at sea level on an adult body is about fifteen tons. Variations of this pressure is compensated by resiliency of the blood vessels, which equalizes the circulatory disturbances. In the old, however, the diminished arterial elasticity accounts for the headache, rheumatic pains, drowsiness, etc., resulting from altered pressure. Relative rarity of the air with oxygen deficiency induces exhaustion. Electric storms produce headache. Positive atmospheric electricity stimulates, and the negative variety present in inclement weather depresses, the individual.

*Memory* is an essential element of thought. One condition of remembering, as Ribot puts it, "is that we should forget." To attempt to recall varied states of consciousness is an herculean task, and in this sense oblivion is often quite necessary for mental health. The brain cells are unquestionably concerned in the physical retention of memories, which we are constrained to believe are so many impressions. It is no reproach to man if we compare the psycho-physical process of memory to *photography*. It is an acknowledged fact that the camera will see more than the human eye, and someone has said that if he purchased

from an optician an instrument so imperfect as the eye he would feel as if he had been defrauded.

Helmholtz observed that the optical study of the eye brought complete disillusion. Some years ago a lady was photographed in Berlin and her portrait showed specks on her face that had been invisible to the eye. A day later she sickened of the small-pox, and the spots then could easily be detected by the eye. Our eye is affected most powerfully by green and yellow, whereas these colors do not at all affect the photographic plate, which is affected most powerfully by the violet rays, which appear dark to our eyes. We can easily detect objects in the moonlight, whereas it is impossible to obtain any picture of a lunar landscape. We employ our senses in a dual direction objectively and subjectively. We have a mind's eye, ear, nose, touch, etc. One may see an object a thousand times, yet unless the mind's eye (*subjective vision*) co-operates in the act of vision the picture is never developed in the mind and the picture memory is correspondingly obscured.

We attain our acquaintance with the world through our senses, but we apperceive with our minds. Though we select the eye as a basis for comparison, we must not forget the vibrations communicated to the brain by the stimuli of the external world. The eye may be aptly compared to a photographic camera. The eyelid is the cap, the iris the shutter, the lens and finally the retina, the sensitive plate. Light is not only chemic, but mechanic, in action. The undulations of light, as is well known, may agitate bodies so

forcibly that they fall to pieces. Thus light is similar in action to sound. We know that there are people who can break a glass by a shrill tone of their voice. When through the senses impressions are conveyed to the brain, the arrangement of the nerve-cell molecules may become so altered as to create different mental impressions. Thus we may speak of the *allotropism of memory*. We know that many elements present themselves in such different states that we could suppose they were different substances. If the poisonous yellow phosphorus is exposed to light it is converted into the non-poisonous red phosphorus. There are without doubt in the brain tissues certain salts, like calcium, which, when exposed to light or its equivalent vibrations, acquire the power of emitting radiations.

The mechanical vibration of an atom may emit ordinary light, and it is possible that its electrical vibration may emit X-rays. Photography of the invisible may thus be attained in the brain by the action of vibrations on sensitized chemic elements. According to the intensity of action of the vibrations, the details of the mental picture may vary—it may be under- or over-exposed. The pictures are later developed, and when not necessary for our mental life are stored up, like the negatives at the photographer's, in our mental storerooms, and fresh prints are made from them in the process of mentation. An interesting case has recently been reported from Norristown, N. J. During a heavy shower at that place Abbot Parker was struck by lightning, and the streaks on his

back soon assumed the image of Christ nailed to the cross. (Fig. 5.)

Similar cases have been reported, and are explained by the sensitized skin acting as a photographic plate. When lightning strikes the skin electrolytic decomposition of the inorganic salts in the body occurs. The electric current transforms the skin into a negative plate. Parker was brought to All Souls' Hospital after the occurrence, and his clothing was removed. His sensitized skin merely received the impression of a crucifix hanging on the wall of his room. The picture developed slowly, like an old-fashioned daguerrotype. Pictures may now be transmitted through a telegraph wire by the telautograph. An artist once reproduced from memory a copy of an inaccessible picture in a distant city, which could not be distinguished from the original picture. It has been said that many reproduced pictures are essentially eye pictures, and a photograph has been taken of such a picture (optogram). If the microscopist has failed to demonstrate brain pictures, it is not because they do not exist, but because he has not found a developer for their demonstration. Memory pictures are never completely effaced. "I feel," said De Quincey, "assured that there is no such thing as ultimately forgetting; traces once impressed upon the memory are indestructible; a thousand accidents may and will interpose a veil between our present consciousness and the secret inscriptions on the mind, but the inscription remains forever."

Some individuals possess the extraordinary power

of *mental* imagery, by which they recall forms and colors as bright as the real objects which they have



(*New York Herald*, Paris, August 21, 1904.)

FIG. 5.—As the image appeared on Parker's back.

seen. This power of mental visualization may be cultivated, as is frequently observed in painters. The auditive type of memory in which individuals remem-

ber by sound is often highly developed among musicians. In my work on "Clinical Diagnosis," in speaking of the phonograph in medicine, I tell of a lady who, on hearing the words of a gentleman spoken into my phonograph but a few days before, at once exclaimed, "I know that voice! It is the voice of Mr. H." I asked her if she knew the gentleman, and she replied in the negative, but she had heard him recite once at an entertainment many months before.

That light is a product of chemism of the living body is probable, as has already been shown in referring to the N-rays in the first chapter. While many of these observations lack scientific demonstration, it is reasonable to hope that "Man is advancing to a stage when he shall no longer remain a stranger to his own life processes." J. Stenson Hooker<sup>76</sup> believes that human rays have a spectrum like ordinary light. He mentions the gift of inner perception which enables some people to see a little further than others, a gift of being able to detect by sense the more rapid vibrations of the cosmic ether. To deny the latter would be equal to saying there are no sounds beyond those we hear. The same writer says that rays emanating from a passionate man have a deep red hue; the good man throws off pink rays; the deep thinker, deep blue; the lover of art, yellow; the depressed person, gray rays; the mentally ill, dark green, etc. Max Müller observes that man has been thousands of years evolving his color sense to its present point. The X-rays are invisible, yet we do not deny their existence. Stokes has shown that color can be



produced in a new way. If the violet light of the spectrum is allowed to fall in a darkened room on a plate of uranium glass it will glow with a bright green light. This observation shows that the light waves set in vibration the molecules of the glass and that they continue for some time in vibration at the rate of their own selection, which is always less than that of the rays of light—which gave the first impulse. Many salts also possess this property in a high degree. Phosphorescence gives rise to colors. Tubes containing sulphide of barium or calcium, illuminated for an instant in a dark room by a beam of sunlight or electric light, display a variety of tints for some minutes afterwards. Di Brazza has more recently described the I-rays, somewhat related to the N-rays, which are given off from the brain during psychic processes.

*The Therapeutic Value of Colors.*—Colors have always been employed for symbolizing the emotions: black represents death; red, the symbol of joy in all oriental countries; yellow, the autumn of life, and white, innocence and purity. Red is a violent color to some and to others soothing. In nervous and mental conditions the judicious choice of colors proves beneficial. I would especially emphasize the sedative effects of blue on the nervous system. Gazing steadfastly on a blue light at night is particularly conducive to sleep. Much of the sedative effect achieved by residence in the country is provoked by green. The effect of color on animals (witness the matador as he excites the infuriated bull to charge by the manipulations of his red cloth) has received more careful study than on man.

*The Physico-Chemistry of Cures.*—Drugs are mere incidents in medical skill. The mind which inhabits the body operates powerfully in health and disease with its strong passions and vivid imaginations. The mind creates pictures equally as varied as the kaleidoscope; hence the mind must be studied to find a picture that will regenerate the patient. Medical practice is more than a discovery of facts: it is the practice of intelligent sympathy, the creation of inspiration and the inoculation of hope. The average patient is not so much concerned about what he has, as by what he thinks he has. "The patient is seldom right; in imaginary diseases he believes too much, in real diseases he does not believe enough." It is easier to understand the cause of diseases than of recoveries; hence the prestige of medicines. There are more false facts than theories. Diagnosis is scientific, and it is commendable, but it must not usurp the province of common sense; for, after all, the aim of all medical service is the healing of the sick. Conservative medicine is too often a practice of trusting to nature and confirming the diagnosis at the autopsy. A classical education is in many instances a digest of knowledge, the possessor of which thanks God that it can be of no practical value to mankind. Quacks live and fatten on what the legitimate physician wastes. The quack recognizes the psychologic aspect of disease which some physicians studiously ignore. The therapeutics of the imagination, or the force of mind over body, is the real secret of quackery. The pseudo-religious quack, the mental scientist, and the Eddyist have all

produced genuine cures which have baffled conventional medical skill.

*Faith-Cures and Science.*—The natural tendency of disease toward recovery has in all ages engendered the creation of popular delusions, for there is no folly, however absurd, which will not secure a following. Carlyle said that there were about forty millions of persons in England, mostly fools; therefore it is understandable where the sustenance of the faith-curst originates. The Eddyist has by no means pre-empted the field of occultism; his rivals are rapidly multiplying as vitiopaths, phrenopathists, vibrationists, metaphysical healers, psychic scientists, mental scientists, etc. Their number would be further augmented were it not for the difficulty in inventing appropriate names to dignify their delusions. Isolated in this sound of trumpet and beat of drums, "the Genius of Medicine sits pensive and alone, her finger on her lips." Scientific medicine never dogmatizes, for it is a mutable creed, not stationary, but progressive, and capable of modification as it assimilates the digested truths of human thought. Science is universal and cannot be circumscribed by a fixed idea or by any exclusive system of practice. The scientific physician is an eclectic in the sense that he selects the most rational and honorable methods of aiding suffering humanity; he approaches all methods without prejudice or prepossession. There may be a little good in all exclusive systems, but there is always a preponderance of evil. Regular medicine strives to eliminate the evil and absorb the good, for it is always the endeavor of the

conscientious physician to seek in the thing the thought that animates its being.

All faith-cures can be accounted for by the effect of the mind upon the body. The suggestion of cure is primarily conveyed to the subject by the operator, and his method is a mere vehicle for such suggestion. The reaction is the idea of cure, in accordance with the law that every idea if left to itself will generate its actuality. The idea of cure is emphasized by previous conviction or the positive assurances of the operator.

*Normal suggestion* has always been employed by the physician for the cure of disease, perhaps not with the assiduity which it truly deserves, for *psychotherapeutics* must now be regarded as an integral part of medical practice. Heretofore the physician has employed suggestion as a mere dilettante, his conservatism prompting him to eschew a practice which might jeopardize his professional reputation, or would perchance effect some moral or mental injury to the patient. Skepticism is as bad as credulity, for the former is "reason without belief, and the latter belief without reason." We are constrained to accept facts whether they represent mind or matter, and if we are compelled to recognize a mental factor in the cure of disease, it must not be entrusted to an unlettered, small-knowing soul, but employed by the physician who is skilled in the diagnosis of mental and physical diseases.

*Religious conversion* predicates the awakening of the center of our dynamic energy by some profound emotion. It is practically a nerve storm or explosion

which rearranges our nerve molecules and induces a mental readjustment. Three features characterize a revival:

1. A terrible consciousness of sin, accompanied by distress of soul and physical manifestations as death-like swoons.

2. A sudden transition into a new world of ecstatic joy.

3. An ethical transformation, so that all things pass entirely away, and all things become new.

Starbuck<sup>40</sup> refers to a *volitional* and *self-surrender type of conversion*. In the former the regenerative change is gradual by jerks and starts until new moral and spiritual habits are created. Very often the "maturing processes," as James<sup>41</sup> calls them, are subconscious, eventuating in results which suddenly grow conscious. In the second type "the personal will" must be given up. In many instances relief persistently refuses to come until the person ceases to resist, or to make an effort in the direction he desires to go. One must submit to the new life, making it the center of a new personality and living from within and not viewing this truth objectively as before. Certain luminous phenomena, called *photisms*, have been coincident with many conversions. Saint Paul had a blinding heavenly vision. Starbuck reports many such instances. Some feel as though a dark room became suddenly illuminated. In all instances of conversion or cure by the volitional or the self-surrender type, may we not regard them in the light of chemical action manifested by energy? The photisms may

be the resultant of chemical energy, just the same as light is often a product of chemical action, or chemical action may be the result of the action of light. A mixture of hydrogen and chlorine gases remain unchanged in the dark, but it violently explodes in the sunlight.

## VI

### THE SYMPTOMS OF SELF-POISONING

ABDOMINAL SYMPTOMS—THE URINE IN SELF-POISONING—COPRÆMIA—THE URIC ACID THEORY—CHOLÆMIA—TESTING THE EFFICIENCY OF THE KIDNEYS AND THE HEART—EXAMINATION OF THE FÆCES

*Abdominal Symptoms.*—We have already referred in the chapter on *fatigue* to many mental symptoms associated with self-poisoning. Here we will confine ourselves exclusively to the symptoms arising from self-poisoning from the alimentary canal, for the reason that this phase of the subject, however imperfectly interpreted, is nevertheless best understood. Intestinal self-poisoning may be acute or chronic. The former is more frequent in the infant and child than in the adult. Here we are concerned with *chronic intestinal toxæmia*, although it must not be assumed that this form is not uncommon in children; in fact, I have traced many nervous symptoms in children to chronic enterogenic poisoning. In a previous chapter reference was made to the organs of defense which practically protect us against the poisons manufactured in our alimentary canal, but there is another factor which has been ignored and which experience

has taught me is most important, *viz.*, *congestion of the veins of the abdomen*.\*

When this venous congestion exists, it interferes with a proper supply of arterial blood, and in consequence the tissues and organs are bathed in pools of stagnant blood—they are practically *asphyxiated*. Again, the impeded circulation cannot remove the toxic products of digestion, and instead of the latter being at once conveyed to organs of elimination like the kidneys, they are arrested or transformed by organs like the liver, which soon prove inadequate to discharge their anti-toxic function: then we have the creation of symptoms which belong to the category of self-poisoning. Villeneuve (1234-1313) is reported to have said: "If thou canst not find anything in the examination of the renal secretion, declare that an

\* This subject has been considered in detail in my recent book on "The Blues." E. B. Treat & Co., New York, 1904. That I am not alone in the contention that *abdominal venous congestion* is perhaps the chief factor in superinducing poisoning is corroborated by many letters received from physicians since the publication of my work. Dr. J. H. Kellogg, who has a national reputation as an author and physician, and who is at the head of the largest sanitarium in the world, at Battle Creek, Mich., writes as follows: "I have read with great pleasure your wonderful little book on 'The Blues.' The perusal of your work has afforded me more pleasure than almost any medical book I have read, chiefly because I find in it confirmation of views which I have held for many years, supported by a multitude of facts observed by yourself and others, many of which were quite new to me. I am sure the profession is more indebted to you for the painstaking labors which have enabled you to establish your theories upon a sound scientific basis than the ordinary medical practitioner can possibly appreciate."



obstruction of the liver exists. Particularly use the word 'obstruction,' since it is not understood, and it is of great importance that people should not understand what thou sayest." Villeneuve in advising deception did not know he was uttering a truism which is certainly applicable in this age of dyspepsia, when the liver is subjected to the grossest dietetic insults. There are many *abdominal symptoms* which suggest self-poisoning, to which only brief reference can be made. Such symptoms are:

1. Relaxed abdominal walls.
2. Gas accumulation in the bowels.
3. Increased sensitiveness of the abdomen.
4. Enlargement of the liver and tenderness of that organ.

The liver is not always tender, and for this reason it may be assumed that the intestinal poisons often gain access to the blood without passing the liver or without irritating the liver cells. I have recently investigated the condition of the cutaneous abdominal veins in abdominal congestion, and find them frequently tortuous and dilated.\* I do not say that the foregoing signs may not occur independently of venous congestion, but I do emphasize the fact that in the majority of instances venous abdominal congestion maintains a permanent condition of intestinal self-poisoning, and unless the congestion is corrected we can never hope to give our patients any permanent relief. The latter statement is not a mere theoretic utterance, but is deduced from the practical

\* Appendix, Note 2.

results achieved by treatment directed mainly toward the relief of the congestion. That this relief is possible of attainment is a matter for consideration in a future chapter. Relaxed abdominal walls are not an invariable concomitant of intra-abdominal congestion; on the contrary, the latter may exist with fairly tense muscles. What I have called the *cardio-splanchnic phenomenon*<sup>79</sup> is a trustworthy sign for testing the grade of abdominal plethora. Many conditions have been found to be identified with self-poisoning, although positive proof that this is really the case has never been adduced. Many constitutional disturbances, notably convulsions in children, are regarded by Heubner to be dependent on gastric disorders, and Nobécourt<sup>74</sup> relates that infants affected with gastro-intestinal affections are liable to develop symptoms suggesting meningitis; and that treatment of the digestive apparatus soon restored conditions to normal. That this is really the fact I have no reason to doubt, based on my treatment of such cases with the abdominal application of the sinusoidal current. If the latter current, which is almost specific in action, is unsuccessful in controlling the symptoms, I always feel justified in excluding self-poisoning as a factor in the production of the symptoms. In the action of this current, then, we have a diagnostic sign of great value in excluding gastro-intestinal putrefaction from participation in the mental and physical pictures supposed to be dependent on self-poisoning. Chronic self-poisoning is in part responsible for many persistent forms of neuralgia, migraine, periodic headaches, etc.

R. C. Kemp<sup>110</sup> studied the relations of the gastro-intestinal tract to nervous and mental diseases. Reference is made to the following abnormal products:

1. Ethylidenediamin, a ptomain found in gastric liquids in dilation, will produce some symptoms found in Grave's disease.

2. Methyl guanidin, resulting from putrefactive processes in the small intestine, causes nervous irritability and convulsions.

3. Cadaverin and putrescin are ptomains found in the colon after constipation, and produce symptoms like muscarin poisoning.

4. Indol, when given to animals, causes cardiac and respiratory depression and spasms. Small quantities taken daily cause headache, colic, diarrhea, unnatural mental activity, and a tendency to neurasthenia.

5. Bile, when absorbed, produces a definite toxæmia.

6. Cholin, which in large doses causes nearly instantaneous death in cats and rabbits.

7. Neurin causes labored breathing, unconsciousness, and convulsions.

8. Muscarin causes convulsions.

All the foregoing poisons produce irritability and tire of the nervous system, and are the exciting factors in many cases of neurasthenia. Therefore, I have coined the word, *Toxiconneurasthenia*, to designate such forms.

*Tetany* is regarded by Albu as the most brilliant example of gastro-intestinal poisoning. In this condition dilatation of the stomach is most frequently encountered. From the urine of a patient suffering from

tetany Albu succeeded in obtaining an alkaloid-like body which was never present in the intervals of the attacks.

*Narcolepsy*, a sudden uncontrollable desire to sleep, frequently encountered in diabetes, obesity, during acute infectious diseases, etc., is supposed to be due to auto-intoxication, and attacks of periodical vomiting have been attributed to the same cause.

There is a form of difficult breathing known as *dyspeptic asthma*, dependent on some alimentary disturbance, which, with correction of the latter, is very amenable to treatment. The difficult breathing in question is supposed to be of toxic origin. It may be remarked incidentally that asthmatic individuals are specially prone to attacks when any indiscretion is committed in diet. I have already shown elsewhere,<sup>42</sup> that such cases of dyspnoea are due to the pressure of an acutely dilated stomach on the heart. To differentiate true from spurious forms of asthma, reference is made to my *tracheal traction test* in the appendix (see note 3).

One may trace some association between intestinal toxins and appendicitis. Brunner<sup>95</sup> shows that the contents of the upper part of the small intestine are less infectious than those of the lower part, and that the appendicular region is specially infectious. We must not forget that toxins are often eliminated through the alimentary canal, thereby inducing secondary gastro-intestinal disturbances. Alt has shown that half the dose of morphin injected subcutaneously is eliminated through the stomach and by

immediate lavage of this organ the toxic action of the drug may be prevented. It has been shown by Albeck that a powerful toxin is elaborated in a strangulated loop of intestine, and that this putrid toxin is the cause of the symptomatic picture we call ileus. The foregoing facts suggest that stomach washing is indicated in many forms of secondary alimentary self-poisoning.

*The Urine in Self-Poisoning.*—*Indican* and the *sulphates* are products of intestinal putrefaction, and appear in the urine. When they are increased in amount in the urine they serve as index to the degree of putrefaction. This is the current opinion, but my observations show that in some suspected chronic cases of self-poisoning the foregoing substances are diminished and that their increased excretion in the urine is associated with a remission in the particular symptoms from which the patient suffers. We shall see later that the sinusoidal current is endowed with the very remarkable quality of promoting the excretion of indican, the sulphates, and other substances. Some contend that if indican can be detected in the urine, even by a feeble reaction, it indicates that it is excreted in excessive quantity. Owing to its combination with the inorganic potash, indican, like all inorganic substances, is easily absorbed from the intestine and is excreted with the urine. This substance being easily demonstrated, it serves as a useful guide in acquainting us with the condition of the digestive canal. Indican in the urine (*indicanuria*) indicates putrefactive fermentation of the proteid substances in the alimen-

tary canal, for in perfect digestion of the proteids it cannot be detected in the urine. Indican is derived from *indol*. When the latter is given to rabbits for some time emaciation results. Given to men, it produces headache, colic, diarrhea, flatulence, insomnia, and exhaustion. Senator has shown that the urine of the newborn contains no indican, because in its intestine there is no putrefaction. He contends, however, that indican is not only a product of intestinal putrefaction, but is likewise derived from tissue destruction in consequence of cachexia.

The large intestine is similar in function to that of the urinary bladder: it is a reservoir for undigested matter. I have noted that when nutrient enemata are given, and all food withheld from the stomach for days, indicanuria of marked degree is present. The term *metabolism* embraces the sum total of the chemical changes which occur in living organisms. One of the characteristic signs of disturbed metabolism is the presence in the urine of indican, and it also serves as an index of the degree of intoxication of the system.

*Acetonuria*.—Acetone is said to be normal in the urine in small quantities, but in certain metabolic disturbances, notably diabetes, the amount becomes pathologic. Recently,<sup>89</sup> cases have been reported presenting the following symptom-complex: vomiting, collapse symptoms, rapid and weak pulse, cyanosis, and dyspnoea. Some of the cases developed in the sequence of operation, whereas others occurred independent of any operative procedure. Acetone and diacetic acid

were present in the urine in practically all the cases. For this *acid intoxication* sodium bicarbonate by the mouth or in enemata and saline infusions are serviceable. Intestinal acetonuria and diaceturia are caused by ingested fatty substances, and for this reason all fatty material must be excluded from the dietary.

*Test for Indican (Indoxyl) (Jaffe).*—Free the urine of substances interfering with the test by adding one-quarter its volume of 10 per cent. solution of lead acetate, and then filtrating. To the filtrate add an equal amount of concentrated hydrochloric acid and one to two drops of a saturated solution of calcium chlorid diluted one-half with water. If indican is present, first a bluish-green tint, later, a distinct blue color appears. If chloroform is now added and the whole thoroughly shaken, the indigo is thrown down as a blue precipitate and the depth of coloration indicates the quantity of indican. In a normal urine this test gives only a rose or faint violet color. As a rule freeing the urine of substances interfering with the test is unnecessary.

*Test of Obermayer.*—Obermayer's reagent: make a solution of strong hydrochloric acid of a specific gravity of 1.19, to which has been added two parts to the thousand of ferric chloride. This fuming yellow liquid keeps indefinitely. First precipitate the urine with a small amount of a solution of lead acetate or subacetate, avoiding an excess, and filter. This removes the pigment. Now take 15 cc. of the filtered urine and mix with an equal bulk of Obermayer's reagent and add 2 cc. of chloroform. *Slowly invert,*

but do not shake the mixture in the tube, which is sealed with the finger or a cork. The chloroform will become colored in proportion to the amount of indican present. It may be necessary to allow the whole to stand for a short time for the complete oxidation of the indoxyl by the ferric chloride. Normal urine gives a very faint blue by this method and any increase is indicated by a deep blue tint in the chloroform. The quantitative determination of indican is given in the Appendix (Note 10).

*Sulphates*.—The only means of making accurate estimations of the sulphates is by weighing the  $\text{BaSO}_4$ , but this is an elaborate process inapplicable to clinical work. The organic sulphates are increased proportionally by the putrefactive decomposition of proteid in the alimentary canal. A simple test for the sulphates in the urine is the following: Add an excess of barium chloride to a urine previously rendered strongly acid with hydrochloric acid, and a whitish precipitate of barium sulphate is formed, which is insoluble in acid. After allowing the urine to stand for several hours, the amount of the precipitate will indicate the quantity of ethereal sulphates.

*Cystinuria* is dependent on toxic substances formed in the intestine, and *oxaluria* is believed by Cantani to be due to excessive starch or sugar decomposition. He shows that oxaluria is frequently associated with diabetes, and both have symptoms in common, *viz.*, emaciation, furuncles, abscesses, etc.

*Uric acid* as a rule is not found uncombined in the urine. Defective metabolism and incomplete oxida-



tion of the proteids cause free uric acid to appear in large quantities in the urine.

An excess of *phosphates* indicates disturbed metabolism of the nervous tissue.

*Oxaluria*, according to Ogden,<sup>96</sup> is frequently caused by excessive fermentation in the gastro-intestinal tract, and dogs fed on meat and cane sugar developed this condition. In this *fermentative oxaluria* there is probably a permanent diminution of gastric hydrochloric acid.

Indican is increased in nearly every case of oxaluria.

*Toxicity of the Urine.*—The *normal urine* contains poisons. Bouchard's method of measuring the toxicity of the urine consists in the intravenous injection of urine into animals and estimating the amount necessary to produce death. The unit of toxicity thus established was the amount necessary to kill 1 kilogramme of animal. He found at least seven independent poisons represented by narcotic, convulsive, and other kinds of poisons. The urine was found to be toxic, independent of its concentration. Bouchard refers most of the poisons appearing in the urine to intestinal putrefaction. In cancer and diabetes, acetone, diacetic acid, and *B*-oxybutyric acid are found in the urine, and they seem to be common in all diseases associated with grave disturbances of nutrition, which signifies increased destruction of albumin.

*Copraemia.*—It is well known that *chronic constipation* is often associated with headache, dizziness, insomnia, lassitude, and other symptoms. It has been

assumed, and with reason, that such manifestations are caused by the absorption from the intestine of putrefactive substances derived from the fæces. In such instances one finds in the urine an increased excretion of indican and the sulphates, but whether the latter are concerned in the production of symptoms is still a debatable question. For all practical purposes it concerns us but little what the *real* substance really is, for we judge the degree of intestinal putrefaction by readily detectable products like the sulphates and indican, on the principle, *Ex pede Herculem*. Again, contrary to current opinion, I have found that in those suffering from self-poisoning, diarrhea, or at any rate, looseness of the bowels, prevails rather than constipation; it would appear that this is nature's method of ridding the organism of noxious products. The odor of the fæces often serves as an index to the grade of intestinal putrefaction. Healthy excreta are free from odor. It was at one time believed that intestinal bacteria were essential to life and digestion. Nuttall and Thierfelder fed guinea-pigs on sterilized milk for eight days under such severe antiseptic precautions that no bacteria could gain access to them, yet the animals lived and thrived as well as control animals fed in the usual way. At the end of the eight days' experiment no bacteria were discovered either by the microscope or culture tube. They also found that vegetable food could be digested without the presence of bacteria. The evident conclusion is that bacterial digestion is by no means a necessity. I place no reliance on the statement of the patient that he has a

regular movement daily. An examination of the abdomen by light percussion will often show the presence of stagnated fæces at different curvatures, *viz.*, the head of the colon, the hepatic flexure, the splenic flexure, and the sigmoid flexure. The entire colon may be loaded, especially the transverse colon. Grant (London *Lancet*, Dec. 31, 1904) suggests giving a tablespoonful of animal charcoal as a test for constipation. Normally it appears in the stools in twenty-four hours. By this means, even though the patient affirms that he is or is not constipated, the charcoal test will decide the question. Forchheimer and others lay particular stress on *chronic ulcerative stomatitis* as a sign of intestinal poisoning.

I have ample reason for believing that many so-called cases of Bright's disease are really instances of *toxic nephritis* superinduced by the irritating action of the excreted poisons on the kidneys. At any rate, I have frequently caused albumin to disappear from the urine after continued seances with the abdominal application of the sinusoidal current. These cases of albuminuria resembled the cyclic forms. Many writers, notably Dieulafoy, have noted minor symptoms of Bright's disease, such as headache, temporary prostration, itching, muscular cramps, etc., which improve or become aggravated with modifications of the digestive anomaly. Favill<sup>93</sup> has reported undoubted cases of nephritis of gastro-intestinal origin. My friend, Dr. V. G. Vecki, in his excellent work on "Sexual Impotence."\* refers to loss of sexual power

\* W. B. Saunders & Co., 1901. P. 110.

as the result of excessive intestinal fermentation and auto-intoxication resulting therefrom. The author in question has told me that extended observations only confirm his original statement, and that he has cured many cases of impaired virility by eliminators and by dieting, so that gastro-intestinal fermentation is minimized.\*

*Diminished virility* is not without influence in the creation of a morbid symptomatic picture often incorrectly interpreted as neurasthenia. I pay no reference in this regard to the condition known as sexual neurasthenia. The sexual function profoundly influences our lives, and, if diminished, it conduces to discontent, melancholy and irritability. Virility is dependent on testicular activity, and in the absence of an internal secretion annihilates all virile impulses. Passion is a minor factor in such impulses. I believe it is possible to exclude, if for diagnostic purposes only, diminished testicular activity as a factor in our lack of well-being. Aphrodisiacs have been discredited by time and experience and no better fate has been accorded to spermin and liquor testiculorum. I have repeatedly demonstrated that after abdominal massage one may increase the excretion of indican in the urine. Resorption of the testicular secretion may be similarly influenced, as follows: the scrotum rests

\* In 1889 Anderson demonstrated that involution of the thymus gland was arrested when guinea pigs were castrated; and Paton has shown more recently that in certain animals the gland in question continues to develop until the sexual organs gain headway. Animals that have never propagated show a greater vestige of the thymus gland,

on the palm of one hand; with the fingers of the other hand the testes and epididymes are frictionally massaged so that they are felt to roll repeatedly under the fingers. No pleasurable sensation is associated with the method and it must be executed twice daily. At first the massage is slightly painful, but with repetition of the act it is overcome. Massage after the manner cited often causes an immediate translation of a pessimist into an optimist and supplants despair by hope and indifference by ambition. My experience with this method relates only to males, but it is reasonable to assume that ovarian massage is equally applicable in individuals of the opposite sex. Testicular massage is of unquestionable influence in reducing abdominal congestion to a degree even exceeding the action of the sinusoidal current, for the reason that its effects are more permanent. I have only clinical evidence to support my contention. Such massage has a profound influence in reducing blood pressure.

We have already briefly referred to the relation existing between intestinal auto-intoxication and insanity and nervous diseases. Evidence is accumulating to show that many forms of neurasthenia are unquestionably associated with disturbed intestinal function. Many cases of epilepsy are caused by the absorption of intestinal toxic matter, or at any rate, the disease is aggravated by such a condition; for it has been repeatedly shown that methods of treatment aiming at asepsis of the alimentary canal have been productive of much good. Hamilton<sup>99</sup> affirms that hypertoxicity of the urine is found not only after an

attack of epilepsy, but is occasionally a warning of its imminence. When the attacks were associated with gastro-intestinal disturbances, indican was increased in the urine. As in other conditions characterized by breaking down of nerve tissue, so in epilepsy the presence of cholin may be demonstrated in the blood. A large number of acute insanities have been shown to be dependent on intestinal disorders. Marie and Bosc have demonstrated that the urine of insane persons shows a toxicity which varies and is more or less identified with the different forms of insanity. Dana (*American Medicine*, Jan. 21, 1905) refers to the *colon* as an organ specially attuned to cerebral states. One cannot observe the apparently causeless recurrence of mania and melancholia without the conviction that behind it all is a disorder of metabolism leading to a toxic state. I have observed many mental diseases dependent solely on intestinal poisoning, and which yielded to treatment by the abdominal application of the sinusoidal current. There will be found many captious critics who will attribute my results to suggestion, for, unfortunately, electrotherapy has lost much of its prestige owing to its invariable association in the minds of many physicians with this unknown quantity. If, however, I am able to show by ocular evidence, as will be done later, that the sinusoidal current has more than a psychic action, I trust I may be able to controvert opposition to conclusions which have graduated from theories to facts. Among rare nervous affections attributed to self-poisoning are:

- I. The periodic development of extreme muscular

weakness of the body (*myesthesia gravis pseudo-paralytica*).

2. Thomsen's diseases.

3. A periodic paralysis of the extremities lasting for a few days and then disappearing.

*Vertigo* is often caused by poisoning of gastric or intestinal origin, and Wagner described an inflammatory affection of the muscles of the body (*polymyositis acuta*), associated with gastric disturbances, which is probably likewise dependent on auto-intoxication.

Cases of *Enterogenic Cyanosis* have been recently described which consist of cyanosis supposedly due to the formation of methemaglobin resulting from the absorption of toxic substances in the intestinal tract. In one instance cyanosis evanesced on an absolutely milk diet, while a nitrogenous diet caused its reappearance.

Many severe forms of anæmia and leukæmia and chlorosis have been attributed to chronic auto-intestinal poisoning, and I believe it was Sir Andrew Clark who said that if he were limited to the choice of one drug in the treatment of chlorosis, he would choose a purgative. He could profitably have added without fear of contradiction that it is a serviceable agent in most diseases. The older writers referred to *fæcal anæmia*, which was controlled by eliminative treatment. It was Broussais, I believe, who promulgated the theory that all diseases originate from the gastrointestinal canal, and when he died he left a legacy, a ponderous volume, containing all he had learned in the practice of medicine. On examination all the

pages were blank with the exception of one, and that contained the following lines: "To maintain your health, keep your head cool, your feet warm and your bowels open." Our "cloaca maxima" must be drained, and the best intestinal antiseptic is a purgative, with restrictions, as will be noted later, for the "purgative habit" is bad. Forchheimer believes that the intestinal mucous membrane manufactures *hemoglobin*. The first positive proof of gastro-intestinal poisoning was shown in 1864, when Betz found *hydrogen sulphide* in the urine of two patients with violent gastro-intestinal symptoms. The foregoing rare condition is known as *hydrothionæmia*. It has been well established that many persistent *chronic skin affections* are due to gastro-intestinal poisoning. Singer has demonstrated that one almost constantly finds in skin diseases associated with disturbances of digestion an increase of the putrefactive products, as evidenced by an increased quantity of ethereal sulphates in the urine. There is no doubt that intestinal poisoning complicates many diseases, notably typhoid fever (also during convalescence), phthisis, malaria, etc. It has even been asserted that *intestinal worms* may of themselves produce toxic symptoms like vertigo, palpitation of the heart, urticaria, etc. Leukart and others claim that the worms excrete poisons. The intestinal worm, the *bothriocephalus latus*, produces a profound anæmia in about one-fifth of the cases, and is probably due to sickness, death, or toxic products of the worms. The *Bence-Jones disease* is a rapid and fatal affection characterized by a large



percentage of albumin in the urine, pain in the chest and back and tumors often appearing on the shoulders, ribs, and arms. I have seen two cases of this disease, and I am very much inclined to regard them as toxic in origin, possibly intestinal, insomuch as in both instances indican in large quantities was persistently present in the urine.

In *general paralysis of the insane* the syphilitic theory of the disease is being abandoned, and modern investigators, notably Robertson, believe that it is of toxic origin dependent upon the presence of some poison originating in the alimentary canal. Butler<sup>90</sup> refers to a condition due to self-poisoning mimicking locomotor ataxia and occurring between the ages of twenty-five and forty-five. The same writer speaks of railroad traveling aggravating auto-intoxication, and manifested as a stupid hallucinatory violence which disappears after a few days' rest. This type often occurs in persons of either sex traveling on their honeymoon.

*The Uric Acid Theory.\**—In the toxic origin of disease the uric acid theory, exploited by Alexander Haig, was extremely fascinating. Ever since the time of Garrod, uric acid was accepted as the real cause of gout. Haig supposed that in health only traces of uric acid are found in the blood, but in the blood of persons who eat excessively and take but little exercise there is an excessive quantity of uric acid, which is

\*Fenner<sup>120</sup> lauds *thyminic acid* as one of the most efficient agents in 4 to 7 grain doses after meals for the so-called uric acid diathesis and gout.

eventually deposited in the muscles, joints, and ligaments, giving rise to a train of bizarre and protean symptoms. Subsequent observations have exploded the uric acid theory, because it was found that uric acid is not poisonous, and is, in fact, absolutely non-irritating to the tissues. It is not the retention of uric acid in the blood which produces the so-called uric acid diathesis, but the presence of other products, the result of deficient oxidation.

Uric acid is formed in the body by decomposition of the nucleins of the nuclei of the cells of the food and of the body. These nucleins, when digested, break up into a series of compounds known collectively as the alloxur, xanthin, or purin bodies. A person to whom is given a nuclein-free food, such as milk, or fasts for a time, still excretes uric acid, which is formed from the nuclei of the cells of the body; this is called the *endogenous purin* in contradistinction to the exogenous purin derived from the food. The quantitative determination of the purin bodies is of no clinical value at the present time. It is more than likely that in gouty conditions we are dealing with a species of blood poisoning, provoked primarily by putrefactive intestinal processes, which cause poisons to enter the blood, and the organism, in resisting such invasion, with a view of neutralizing the poisons, causes the fixed cells and leucocytes to break down, resulting in the formation of an excess of urates.

As scientists, we may discountenance the Haig theory; but as practitioners we are compelled to recognize truth in some of the results. Thus, I can sub-

stantiate what Haig says regarding the *bread-and-fruit-diet* in certain high-blood pressure groups of



FIG. 6.—The author's method of transmitted palpitation of the liver.

poisonings, expressed as headache, epilepsy, depression, neuralgia, dropsy, obesity, etc. In such in-

stances the following diet is at least worthy of a trial. Roughly speaking, an individual weighing 140 pounds is required to consume twenty-one ounces of bread-stuff a day, supplemented by seven ounces of dry fruits. To this may be added a small quantity of potato or other vegetable, and any fresh fruit in season. The bread may be made as a pudding, using a little milk, but so far as possible fluids should be excluded. The foregoing day's food may be divided into three meals, each containing seven ounces of breadstuffs and two or three ounces of dry fruits. A blood-pressure of about 155 mm. can be reduced in a week or more to 120 mm.

*Cholæmia*.—This condition is provoked by the absorption of *bilirubin*, which should have been eliminated into the intestine with the bile. Two-thirds of the toxicity of the bile is supposed to be due to bilirubin. In the average patient hepatic insufficiency is the underlying cause of cholæmia. The skin is yellowish in hue, and is usually known as the "bilious complexion." The nervous symptoms are not unlike those of neurasthenia, to which are added mental symptoms varying from despondency to delusional melancholia. As a rule one finds that if the liver is correctly palpated this organ is painful on pressure and enlarged. I employ a method of *transmitted palpation*, which is especially useful in detecting slight grades of liver tenderness. I place the palm of one hand over the liver region and with the clenched fist of the other hand strike the back of the fingers in contact with the chest a series of vigorous blows. (Fig. 6.)

This is a useful method for treating liver insufficiency, and an exercise of this kind of five minutes' duration is equivalent to a horseback ride of many miles, if the end sought to be secured by the ride is vigorous liver massage. For some time I have experimentally palpated the liver after this manner in many persons, and could thus determine the disposition of an individual. A person with an equable temperament could stand any degree of concussion without flinching, whereas the irritable individual suffered pain from an almost imperceptible blow. Examination of the urine for bilirubin in cholæmia is usually without result, although examination of the blood is usually positive.

About 3 cc. of blood from the punctured finger is allowed to drop into a dry, clean vessel, which is put aside without shaking in a cool place for twenty-four hours. The serum is drawn off from the clot and Gmelin's test is used. Just above the point of contact of the acid a bluish ring appears. Even in normal serum, according to Hayem, the reaction to bilirubin is positive in dilutions of 1 to 40,000; if the serum, however, is diluted with two-thirds normal salt solution and a positive reaction is obtained, the diagnosis of cholæmia is assured. *Carbonacidemia*, or an excess of carbonic acid in the tissues, has just been heralded as a prolific cause of disease. This theory of Lahmann recounts nothing new. It has always been recognized that insufficient respiratory activity compromises nutrition, and that well-developed lungs

are necessary to health, and an efficient avenue for getting rid of accumulated carbonic acid.

*Testing the Efficiency of the Kidneys.*—Determining the functional efficiency of the kidneys is a matter of great importance in the diagnosis and treatment of self-poisoning. Estimation of the *nitrogenous excretion* is of little value, insomuch as there is no fixed quantity of urea or nitrogen excreted. A certain amount of the nitrogen of the body is excreted in the fæces, hence without taking the latter into consideration it is impossible to estimate the total nitrogen removed from the body. It has also been found that the fluctuations of nitrogenous excretion in nephritics may be no more than occurs in healthy persons. Practically the same observations apply to the excretion of *chlorides*. Even the determination of the *freezing point* of the urine furnishes no accurate guide. Testing the permeability of the kidneys, based on the principle that they have an extraordinary capacity for excreting poisons, has suggested the use of *methylene blue*. An injection of the latter is supposed to be protracted beyond thirty minutes in functional incapacity of the kidneys, but unfortunately even in nephritics there is no alteration in the time of excretion, hence this method must be abandoned as unreliable. Little more can be expected from the recently suggested *indigo-carmin*. Determination of the *freezing point of the blood* is at the present time the best method in the diagnosis of renal insufficiency. The molecular concentration of the blood is almost constant, the freezing point being  $.55^{\circ}$  to  $.57^{\circ}$  C. below that of distilled

water. In renal insufficiency there is an increased depression of the freezing point down to  $-75^{\circ}$  or  $-1^{\circ}$  C. It is well to remember that in renal insufficiency, when the choice of an anæsthetic is made, that both chloroform and ether irritate the kidneys, and that *nitrous oxide* is preferable. Bevan and Favill (*J. A. M. A.*, Sept. 9, 1905) refer to the dangers of chloroform anesthesia, specially in children. The most important injury is to the liver cells, resulting in hepatic toxemia. Symptoms usually develop from 10 to 150 hours after anesthesia.

*Testing the Efficiency of the Heart.*—Broken compensation of the heart muscle conduces to stagnation of the blood stream, and is therefore an important factor in the successful treatment of auto-intoxication. Minor grades of unsuspected cardiac insufficiency exist; therefore the following simple methods for its recognition are apposite:

1. *The pulse method.* In the cardiopath the pulse is altered in character after body movements and physical exertion to a degree more pronounced than in health, and such alteration is proportional to the insufficiency of the heart muscle. When the heart is healthy and the pulse is counted first in the erect and again in the recumbent posture, a retardation of the pulse in the latter position from ten to twelve beats in a minute is noted. If the heart muscle is weak, then the pulse retardation in the recumbent posture becomes less and less pronounced the greater the degree of cardiac insufficiency, until in pronounced grades of the latter the pulse frequency may even

be greater in the recumbent than in the erect posture.

2. *Blood pressure method.* This method, which, like the foregoing one, originated with Mendelsohn,<sup>111</sup> is dependent on the fact that muscular work is associated with alterations in the arterial blood pressure. Whereas in health muscular exertion causes a *rise in blood pressure*, in heart insufficiency this rule is reversed, *viz.*, muscular exertion reduces the blood pressure. The less evident the rise in blood pressure after muscular exertion, and the deeper the remissions of the blood pressure curve and the less muscular exercise it takes, *ceteris paribus*, to produce such remissions of blood pressure, and the longer it takes for the blood pressure curve to attain the normal, the greater the functional incapacity of the heart.

3. *The vasomotor method.* The writer has described this method elsewhere.<sup>64</sup> It depends on the fact that blood pressure is the resultant of two factors, *viz.*, force of the cardiac ventricle and vasoconstriction. Remove the latter, and the ventricular force will come into play. Blood pressure as taken ordinarily means nothing, for it is difficult to gauge how much of it is due to the action of the vasomotor nerves and how much to the condition of the heart muscle. The heart may be very weak and yet show high blood pressure, because vasoconstriction compensates a failing heart. The method is, briefly, to take blood pressure in the usual way and note the blood pressure; next have the patient inhale *amyl nitrite* from a bottle until the physiologic action of



the drug is secured, at which time again take the blood pressure. In the norm the average *increase* of the pressure after the inhalation averages from 6 to 10 mm. In cardiac enfeeblement there is a *fall* instead of a rise of pressure, and the degree of fall is proportional to the degree of myocardial insufficiency. All my investigations were made with the Riva-Rocci instrument. Herz (*Deutsch. Med. Woch.*, Jan. 31, 1905) notes that when patient is directed to bend his forearm and straighten it again, concentrating his attention on the movement and doing it slowly, that only in heart insufficiency is there a retardation in the pulse after the movement.

*Examination of the Fæces.*—It is impossible to correctly interpret intestinal auto-intoxication and other anomalies of the alimentary canal without a fæcal examination. Normal fæces should consist of nothing but indigestible food residues, bacteria and remains of the digestive secretions, notably biliary coloring matter. *Schmidt's test diet*<sup>112</sup> is one that is perfectly digested by the normal intestines, and is as follows:

Morning: 0.5 liter milk, or, when milk does not agree, 0.5 liter cocoa (made from 20 grams powdered cocoa, 10 grams sugar, 400 grams water, and 100 grams milk), and 50 grams zwieback.

Forenoon: 0.5 liter oatmeal gruel (prepared from 40 grams oatmeal, 10 grams butter, 200 grams milk, 300 grams water, and one egg). This gruel should be strained.

Noon: 125 grams hashed beef (raw weight)

superficially roasted in 20 grams butter, so that internally it still remains raw. Also 250 grams potato purée (prepared from 190 grams mashed potatoes, 100 grams milk, and 10 grams butter).

Afternoon: The same as morning.

Evening: The same as forenoon.

The stool from this diet is homogeneous and a lighter color than previous stools. The second stool is usually due to the test diet. It contains little fat, not free, but in the form of soaps or fatty acids. It contains no connective tissue, muscle fiber or starch. Microscopically, muscle fibers or starch may be present in small amounts, but the fibers have lost their striation and the starch is enclosed in cells, not free. Fat in droplets is abnormal. The special function of the stomach is to digest the connective tissue of the meat, so that much connective tissue in the stool indicates gastric inactivity. *Liver activity* is indicated by the presence of *urobilin*. The test for the latter is as follows: 10 grams of the stools are rubbed in a mortar with a concentrated *mercuric chloride* solution and allowed to stand from six to twenty-four hours. Urobilin will be colored red, while bilirubin converted into biliverdin imparts to the mass a green color. Urobilin and bilirubin indicate that the liver is functionally active and that the biliary passages are open. The microscope will show the green tint of bilirubin, which may not be evident macroscopically because the green color may be obscured by the larger amount of urobilin.

There are three intestinal functions: *secretion*, *ab-*

*sorption, and motility.* *Motility* is measured by administering a gram of carmine and noting when the voided fæces are stained pink. The presence of considerable amounts of soaps and fatty acids indicates that they have been digested, but not absorbed. Bilirubin is in the norm changed to urobilin in the small intestine, and when this conversion fails, as is shown by the mercuric chloride test, it indicates that there is an intestinal anomaly. Repeated examinations of the fæces will guide us in prescribing a suitable diet. This subject is more fully treated in a contribution by Dr. J. H. Salisbury, of Chicago, in *Medicine*, April, 1905, and by Dr. Heinrich Stern, who suggests a simplified diet for the determination of intestinal functions, in the *Medical Record*, July 8, 1905.

## VII

### THE PSYCHOLOGY OF LIVING IN RELATION TO THE PREVENTION AND CURE OF SELF-POISONING

THE PSYCHOLOGY OF EATING—HOW MUCH TO EAT—  
WHAT TO EAT—HOW TO EAT—WHEN TO EAT—  
FURTHER TREATMENT OF SELF-POISONING—  
EVACUATION OF THE GASTRO-INTESTINAL CANAL  
—NEUTRALIZATION OF THE POISONS—INFUSION  
SOLUTIONS — ELIMINATION TREATMENT — ELEC-  
TRIC LIGHT BATH—LIVER EXERCISES—ABDOMINAL  
SUPPORT.

*The Psychology of Eating.*—Sir William Roberts has referred to the palate as the dietetic conscience, and Dr. Allison said: "Let me diet a person and I can give him almost any kind of disease known—long life or short life." "To eat little," said Cornaro, "and that little of simple food, is to prolong life." The majority of people dig their graves with their knives and forks, and Dr. Abernethy observed "there is no beast of burden in the world so overloaded as the human stomach." Every farmer knows the influence of the quality and quantity of food on his animals, and in this respect one is prompted to recall what Voltaire said: "If as much care were taken to perpetuate a race of fine men as is done to prevent the mixture of ignoble blood in horses and dogs, the genealogy

of everyone would be written on his face and displayed in his manners."

"Simplicity in habits of eating," says Kellogg, "and the avoidance of all stimulating foods, are, with the exception of religion, the most powerful of all aids to purity of life." Talmage said that "many a man is trying to do by prayer what can only be done by correct diet."

"Fat paunches have lean pates—and dainty bits  
Make rich the ribs, but bankrupt quite the wits."

The elements of food from a practical standpoint can be divided into palatable and nutritive. The taking of the former may be regarded as the quantitative, and the latter as the qualitative ingestion of food. All of us eat too much. Digestion always signifies an expenditure of nerve force; therefore it is wise to remember that a minimum of food means a minimum of digestive work. Nervous breakdown can more often be attributed to overwork of the digestive than the mental apparatus. The brain work that is ordinarily achieved by the conventional diet is surprising. Abstemious habits in eating will conduce to better and harder brain work.

I believe it was a Carlylian observation that the average American meal was an unpunished crime. The entire matter of self-poisoning and diminished resistance of the organism to disease is a question of food, "Fortunate is the patient," says Dr. James Arneill, "whose advice comes from a man with a normal alimentary tract. It is but human nature for

the doctor to consider his own stomach and intestines as models of their kind. . . . We all find ourselves persistently advising against good, sensible nutritious food, for no other reason than that they disagree with us." The personal factor in relation to food is so important that the best physician is he who disregards self and studies human nature objectively, with a view of studying all the idiosyncrasies of his patient in relation to his health."

The following subjects are entitled to consideration: 1. How much to eat; 2. What to eat; 3. How to eat; 4. When to eat.

*How Much to Eat.*—Cornaro, who lived over three hundred years ago and who was a physical wreck at the age of forty, by reforming his habits lived to be a centenarian, declared that all persons ate more than was necessary. Luigi Cornaro, the Venetian nobleman, restricted himself for a time to a daily allowance of not more than twelve ounces of solid food and fourteen ounces of wine. Later he found that when at the age of seventy he experimented with an extra two ounces a day, the attempt nearly proved fatal. Careful observations show that those who live longest have been most abstemious in eating. Metchnikoff, in his book, "The Nature of Man," strives to solve the problem of old age by first directing our attention to the *phagocytes*. The latter are the scavenger cells of the body which do battle with the germs of disease and devour them. They also replace impaired tissues. After the phagocytes have done combat with the invading hosts, they feed upon

the weakened tissues, and still further weaken them. The dangerous germs come chiefly from the intestinal tract, where the intestinal flora is divided into harmful and beneficent germs. Now if by any means we can prevent the intestinal germs from gaining access to the blood, we spare the energy of the phagocytes so necessary for nutrition, and thus thwart the advent of old age. A man, according to this theory, is not only as old as his arteries, but as old as all the tissues of his body. The exclusion of food which is likely to prove a suitable soil for the intestinal flora constitutes an available means for inhibiting phagocytosis.

*Sour milk microbes* cause the formation of lactic acid, and are antagonistic to the microbes of putrefaction. Therefore soured milk or kephir is recommended by this author in preventing intestinal putrefaction. He also suggests using thoroughly cooked or sterilized food for prolonging the duration of life. The same writer suggests eliminating the breeding place of these microbes by surgical means, *i. e.*, by emptying the small intestines into the outer world by a more direct route.

Mott observed that if a medieval devil were desirous of discovering the most subtle and expeditious method of exterminating mankind mentally, morally, and physically, he would have employed every means to tempt and pervert their appetite. He would also have suggested means of preventing man from taking exercise and breathing fresh air.

The foregoing portrays civilized man. A pertinent example of how men gauge their feeding capacity is

instanced daily in our restaurants. The bantam-weight is served with the same sized plates, cups, spoons, and portions as the heavy-weight. I doubt whether most persons really know how much they do eat. On this point they can gain precise information if they will put into a receptacle the same quantity of food they put each time into their mouths. An experiment like the foregoing will be sure to gain more converts to the gospel of moderation than all the scientific exhortations of dietists. It is not what we eat, but what we can digest; and what cannot be digested is the contributory revenue of gout, rheumatism, and innumerable distempers. All food can be classified as follows:

1. Proteid or albuminous (eggs, meat, gluten of bread, etc.). They contain about 16 per cent. of nitrogen.

2. Carbohydrates (sugar and starches).

3. Fats, of animal and vegetable origin. The physiologic value of each of the three classes of food-stuffs is, according to Rubner, as follows:

1 gram proteid .....	4.1 kilocalories
1 gram fat .....	9.3       "
1 gram carbohydrate ....	4.1       "

Proteid foods supply the waste from the active tissues of the body, and are therefore most essential to life. The carbohydrates and fats are necessary for the energy which they furnish on oxidation. An excess of proteid food must yield an excessive quan-



tity of nitrogenous waste matter. The fact is that an excess of any variety of food calls forth an unnecessary amount of energy for its disposal by digestion, which, if incompletely performed, undergoes putrefaction and fermentation in the alimentary canal. According to the accepted dietary standard of Voit, a man engaged in moderate work requires 118 grams of proteid food, 56 grams of fat, and 500 grams of carbohydrates. (A gram is equivalent to 15.433 grains, Troy, or  $\frac{1}{28}$  ounce [av.].) The total fuel value of the foregoing diet is equivalent to 3,055 large calories or heat units per day. Voit increases the daily requirements with hard work to 145 grams of proteid, 160 grams of fat, and 450 grams of carbohydrates = 3,370 large calories. The foregoing figures represent the actual daily requirements of the body. Numerous experiments have shown that men may thrive on one-fourth the amount of proteid food per day specified in the Voit standard. We can obtain all the calories required from fat, but the latter will not maintain nutrition. Proteid food is essential to life, therefore food must be estimated, as Davis puts it, in terms of proteid and calories required.

The intimate relation existing between the brain and the stomach demonstrates the influence of the stomach on the mind. We think as we digest, and if we digest imperfectly, so are our thoughts perverted in like ratio. It has been said that an European family could live on what an American family throws away. St. Anthony is said to have attained the age of 105 years on a diet of only bread and water. The

Spartans contented themselves with but one meal a day. We must remember that we cannot dispose of food in the stomach as coal is consumed in a furnace; but it must be digested, absorbed, modified chemically and physically before being selected by the cells, and finally it must be changed to prepare it for elimination. An ordinary prison ration may be cited as a paradigm in showing the amount of food necessary to maintain health. Breakfast consists of a cereal or vegetable soup, with bread and butter or milk; dinner: meat or baked beans, vegetables, and bread or fruit; supper: bread and butter, or cereal and milk. After all has been said about how much to eat, if I were a dietetic sovereign I would issue a manifesto proscribing the so-called "meal" which consists essentially of laying in a store of provisions for future emergencies: not so much for the object of satisfying the present necessity as for providing for the necessities which may arise. Nature has made provision for the camel's endurance of long drought with great masses of cells in which water is stored up, and had she considered that this provision were necessary for man she would have created it. I never fully realized why it was that I always suffered so much discomfort in traveling until the fact dawned upon me that I was adopting the cameloid method of storage. When I discovered that I could appease possible hunger with crackers, a box of which I always carry while traveling, the discomforts of gorging soon disappeared.

Eating frequently during the day, rather than in the indulgence of meals, will do much to obviate the

tendency of over-eating. If one will not eschew the conventional meal, rising from the latter at a time when hunger is appeased, or when still feeling "a little hungry," will accomplish the same object. Many methods have been suggested to control the tendency to over-eat. The "no breakfast plan" is one of them. My observations, however, have taught me that when any meal is omitted the individual makes good the remission by over-indulgence at a subsequent repast.

*What to Eat.*—The fruitarian or the vegetarian emphasizes his particular fad by directing attention to the necessity of subsisting on a special kind of food. The poet Shelley was a dietetic revolutionist, and with the same method of reasoning wanted us to become vegetarians and marry our sisters. Man is essentially an omnivorous animal, and he is therefore justified in making his selection from all the nutritious products furnished by nature; therefore a mixed diet responds best to our demands. Our dietetic sins can never be solved by faddists. The great and only danger lies in *over-eating*. Possibly we could dispose of our gigantic meals if we lived the strenuous open-air lives of our ancestors; but the trouble is that we cannot combine the pastime of an epicure with the habits of a recluse. Deprivation of specific articles of food certainly reacts on our well-being. Thus it has been found that if the hysterical take an excess of salt (*hyperchloridation*) their nervous symptoms become aggravated and diarrhea and vomiting ensue. A diminished ingestion of salt (*hypochloridation*) causes

lassitude and incapacity to work, cramps, and dyspeptic symptoms. In epilepsy great benefit is derived from withholding common salt from the patient's food, while administering bromides. It is supposed that the bromides replace the more easily assimilated chlorides which have a greater affinity for the body cells. It has been repeatedly demonstrated that epileptic attacks can be reduced from a third to a half by dietetic regulations. It has also been shown that in Bright's disease, dechlorination by exclusion of salt reduces the dropsy and percentage of albumin in the urine. Vincent has shown that the hydrochloric acid in the stomach is derived from chloride of sodium, and that a diminished ingestion of salt lessens the amount of gastric juice. The same writer has cured gastralgias due to an excess of hydrochloric acid by diminishing the ingestion of salt. It is also certain that in children autosepsis of intestinal organ is very often caused by starchy foods, owing to the retarded development of pancreatic digestion. About the best place for studying at close range the ingenuity displayed in eating is on the dining cars of our railroads. When I last came across the continent, a cadaverous-looking woman seated herself at my table. In the course of conversation she informed me that she was an inveterate sufferer from dyspepsia, and I had no reason to doubt her word when I discovered what she ordered for dinner—*soup and ice cream!*

Vegetable foods contain a large quantity of water and a small amount of proteid and fat, hence they must be consumed in excessive quantity to furnish the pro-

teid that is required. The albumin of vegetables is less easily absorbed than animal albumin, hence this fact demonstrates the still greater quantity of vegetable food that must be ingested to meet the demands of nutrition. Thus 2,000 grams of dry lentils, which contain a large quantity of proteid for a vegetable food, contain only as much proteid as would be furnished by 600 grams of cooked meat. An excess of vegetable food taxes the muscular power of the alimentary canal, the strength of which is necessary in the process of digestion, and when this is delayed it undergoes fermentation. Green vegetables, like cabbage, cauliflower, spinach, tomatoes, celery, etc., furnish little nourishment and make a bulky form of food. Horace Fletcher,\* in his excellent book, tells of the complete state of nutrition maintained by individuals of about the same weight, on widely different quantities of food similar in quality. The daily diet of one of the subjects consisted of  $3\frac{1}{2}$  pounds of potatoes, 8 eggs, a pint and a half of milk, and half a pint of cream. The diet of the other consisted of 12 ounces of solid food (like Cornaro) made up of 3 eggs and the remainder of the 12 ounces in potatoes and an equal quantity of liquid food similar to that taken by the other subjects. Among the animal foods which have a high nutritive value is *milk*. It is a perfect food, easily digested and cheap. While children may easily digest milk, some adults cannot do so, owing to the presence of the sugar of milk. In such instances *buttermilk* is an excellent substitute, and so is *koumyss*.

\* Appendix, Note 9.

*Cream* is one of the most easily digested fats. A pint of cream will yield 1,125 more calories (1,425 calories) than four quarts of milk (Davis). If we wish to consistently try a *milk diet* as a means of reducing self-poisoning to a minimum, we must remember that while milk contains all the food elements necessary to maintain the nutritive equilibrium, a quantity of 3 to 4 liters (2,500 calories) is necessary daily. Taking this quantity of milk daily burdens the digestive apparatus, but this may be obviated by the addition to the milk of *sterile cream* in the proportion of 1 to 4. This addition enables one to reduce the milk from  $1\frac{1}{2}$  to  $1\frac{3}{4}$  liters daily and still maintain sufficient nutrition for a patient confined in bed. *Eggs* are a complete food, and contain all the ingredients necessary for nutrition. An egg usually furnishes 7 grams of proteid; therefore 15 to 20 eggs consumed by a man each day will furnish sufficient proteid. Eggs variously prepared are easily digested.

*Meats* furnish the largest proportion of proteid in man's diet. It has been shown that no decided difference exists in the nitrogen output as between white and dark meats, hence either can be used when meat is indicated.

*Fish* is a cheap kind of proteid food. The ratio that should exist between animal and vegetable food is, according to Davis, about one part of raw animal food to three parts of raw vegetable food.

*Sugar* is a muscular food, for it delays fatigue and increases muscular work, as has been repeatedly demonstrated upon athletes and soldiers. The adult, how-

ever, cannot dispose of more than three ounces of sugar a day without causing indigestion.

The *cereals* contain a great deal of starch. Rice leaves but very little residue in the bowels, inasmuch as the starch which it contains is easily digested. *Fruits* and *nuts* have some nutritive value. Of the *beverages*, tea and coffee, while primarily stimulating in their effects, will sometimes create, if consumed to excess, digestive and nervous disturbances. *Cocoa*, however, is nutritious as well as stimulating, and its nutritive value is further increased by the addition of milk and sugar. It does not produce nervous symptoms like coffee and tea. Of the *alcoholic beverages*, one may speak in general terms, and say that they are unnecessary to the healthy man—or for that matter to the sick man, for we possess many substances that can substitute their physiologic action. *Alcohol* is a veritable poison to living matter. It retards digestion by precipitating the pepsin of the gastric juice and by coagulating the albumin of foods, makes them less soluble.

The kind and amount of food required depends on the character of work, temperature of the air and weight of the individual. The average person eats daily 16 ounces of starch,  $3\frac{1}{2}$  ounces of albumin and about  $2\frac{1}{2}$  ounces of fat. This quantity is perhaps too large and may be reduced by thorough mastication.

We have yet to consider the character of the diet according to different modes of life. The man who does much physical work requires more food than the brain-worker. *Aged persons* require less food than

the young, for the reason that the tissues have ceased to grow, and repair proceeds slowly. Food should be consumed in small quantities at frequent intervals, rather than at one time. Proteids are not so essential as in early life.

Brain work does not increase bodily waste to the extent of physical work. Brain-workers therefore require but a minimum of food with a maximum amount of exercise. A person leading a sedentary life utilizes in work only one-tenth part of the food eaten, while the remainder accumulates in the body as unused material, provided the same amount of food is consumed. It was at one time supposed that because the brain contained much phosphorus, fish, which contained the same element, was specially suitable for brain-workers. This theory observation has exploded. Intense mental work retards digestion, therefore such work should not be done after a meal.

The value of *sleep* after a repast is an indulgence worthy of encouragement. The lower animals always sleep after eating a full meal. Necessary to good digestion is a plentiful supply of blood to the stomach. The brain in activity is furnished with one-seventh part of the blood in the body, whereas during sleep the amount of blood in the brain is very much diminished, hence sleep will cause a determination of blood to the stomach. For a like reason exercise must not be taken after eating a meal, nor must one eat immediately after exercise.

The proper diet for one who does much physical work is a generous mixed diet, and large amounts of



proteids must be taken to increase muscular work. It has been shown that *sugar* is a valuable food for increasing muscular energy. It can be taken as such, but not in cakes and pies, owing to their difficulty of digestion.

*How to Eat (Euphagia).*—The primary requisite is a clean mouth and good teeth. Any physician who seeks a positive clue to the personal cleanliness of his patient should examine the teeth of the latter. A person with bad teeth, or even false teeth, is from necessity a pessimist, for how can he appreciate the beneficence of Nature when he is denied the enjoyment of eating? We must regard the dentist as a faithful sentinel who guards the portal to our alimentary canal. The mouth should be rinsed out and the teeth cleaned before and after each meal, so that taste, which is so necessary to good digestion, may be made more acute. The most important act in eating is *mastication*. The latter achieves the following: it facilitates the swallowing of food, it breaks up the food so that it can be acted upon by all the digestive fluids; it increases the flow of saliva. One is able to trace the majority of cases of indigestion to *imperfect mastication*. Prolonged mastication increases the nutritive food value, and in consequence less food is demanded to meet the requirements of the body. Mr. Fletcher found that after he had begun to excessively insalivate his food, both liquid and solid, until all its original taste had been removed from it, that there was a curious inability to swallow and a closing of the throat against imperfectly masticated food. By this

method he was cured of two maladies which were regarded as chronic. All liquids, like soups, coffee, tea, etc., must be regarded in the same way as solids, and thoroughly insalivated before being swallowed. It was formerly supposed that the quantity of food stimulated the alimentary reflexes, but now we know that the latter are not mechanic, but chemic. Free acid in the stomach opens the pylorus, and the acid contents now coming in contact with the duodenum provoke a reflex which closes the pylorus. The bile and pancreatic juice neutralize the acid and a fresh outflow of gastric contents occurs. It will be noted that the foregoing automatism is chemic, not mechanic. Now, in my experience most cases of dyspepsia are concerned with the inability to digest starchy food. The saliva acts particularly in digesting starch, and if mastication were sufficiently prolonged, starch could be digested in the mouth. As it is, the starch is digested in the stomach owing to the swallowed alkaline saliva. It has been shown that mastication will increase the flow of gastric juice, which still further aids digestion. Mastication also exalts the sense of taste. Pawlow has shown that when a dog swallows small pebbles, salt, balls of starch, etc., the glands of the stomach do not secrete, whereas when meat or sugar is ingested there is an immediate flow of juice. In other words, the intensity of the secretion is proportional to the pleasure provoked by the food. Someone suggested that to counteract the evils of dyspepsia one must count the bites. For every mouthful of meat, 32 bites must be allowed, or one to every tooth. If the meat

is tough, 64 bites must be allowed and 96 bites if very tough. Thorough mastication prevents overeating. The modern tendency of eating is to reject food requiring mastication, and this refers in all cogency to soft and pappy foods which can be swallowed in large quantities. Drinking at meals is only an excuse for lazy mastication. To encourage the exalted art of mastication, meats should be cut into very small pieces before being introduced into the mouth. It has been shown that a glass of cold water will reduce the temperature of the stomach contents to 70 degrees F. and half an hour elapsed before the normal temperature was again reached. When it is recalled that a temperature of 100 degrees F. is necessary for digestion it is obvious that any reduction of temperature will retard digestion. Many of our articles of food regarded as indigestible are only so because they have been incompletely comminuted by chewing. The frequency of appendicitis will no doubt be traced to dietetic errors. Many persistent forms of rheumatism, bronchitis, nasal catarrh, etc., may be traced to incomplete salivary digestion. The starch of our food which should at least have been partially digested in the mouth gains access to the alimentary canal and ferments. Poisons result which, when absorbed into the blood, diminish cellular resistance and invite the deleterious action of germs. The epoch-making experiments of Professor Pawlow demonstrate the psychic influence on digestion and show that *attention* is a necessary ingredient of digestion and the enjoyment of food. Eating is too important a function to be treated

in a desultory manner. We should dine, not eat. How many of us can truly say that while engaged in eating our thoughts are wholly concentrated on our food. It has been shown that when the mouth completely fulfills its part in digestion, all the rest is easy of attainment by the natural automatic processes within the body. The influence of the perceptions on the salivary flow is well known. The sight or idea of food may "make the mouth water." Experiments have shown that in dogs the sight of food caused a more abundant secretion of saliva than its ingestion, and it has also been demonstrated that the nature of the saliva varies with the particular kind of food. Thus the sight of salt causes a clear liquid secretion to flow, whereas with meat, the secretion becomes viscous. The foregoing observations suggest the importance of attention in eating and of the necessity of eating only food that is agreeable to the senses and rejecting that which is unpleasant. Pleasurable anticipations seem to put into action the functions necessary for good digestion. When the entire dietetic question is sifted down to its rational status, one is not very far astray in saying it is not what one eats, but how one eats. If one eats in a hurry (*tachyphagia*) or when tired and immediately resumes work before digestion is fairly started, all the diets and predigested and breakfast foods will not save one from dyspepsia and its attendant evils. Again, moderation is the keynote to health. The immunity from disease enjoyed by the Japanese armies is due to their simple diet of dried fish and rice, and they have

taught the civilized nations how endurance and health can be attained without embarrassing the commissary department.

*When to Eat.*—The essential factor in digestion is appetite. "Let good digestion wait on appetite, and health on both." It indicates the necessity of the body for nourishment. Thorough mastication soon satisfies the appetite and checks overindulgence. Appetite indicates the ability of the digestive apparatus to perform its work properly; it is the most important stimulant of digestion. In his book, "The Work of the Digestive Glands," the result of ten years' experimental observations, Pawlow shows the digestive value of appetite. His studies on appetite were conducted as follows: Into the stomach of a sleeping dog or one whose attention was diverted 100 grams of flesh were introduced through a fistula. After an hour and a half the flesh was withdrawn by means of a string to which the meat had been fastened. The loss in weight of the meat ingested was only 6 grams.

The same amount of flesh was again introduced into the stomach of the dog through the gastric fistula, but in this experiment the food was not introduced until the appetite of the dog had been stimulated by the sight and smell of the meat. Under these conditions the weight of the flesh was reduced 30 grams. The difference in the amount of flesh digested in the two experiments therefore represents the value of appetite. After this and other observations on appetite, Pawlow formulates the following "golden rule" in dietetics: "Give no directions with regard to food till you have

made inquiries concerning the inclinations and habits of your patient."

Every food determines a certain amount of digestive work, and when a given dietary is long continued, definite and fixed types of glands are set up, which can only slowly and with difficulty be altered. In consequence, it is frequently experienced that digestive disturbances are instituted if a change be radically and suddenly made from one dietetic *régime* to another. These disturbances are expressions of the temporary insufficiency of the digestive glands to meet the new demands upon them.<sup>49</sup>

Dr. J. H. Kellogg<sup>46</sup> tells of the practice prevailing at the Battle Creek Sanitarium of furnishing the guests and nurses two regular meals daily, at 8 A. M. and 3 P. M. The universal testimony of all those accustomed to these hours for eating is that more and better work is done than when three meals are taken. The habit of eating at regulation intervals, he says, must be encouraged, for digestion, like all functions, is rhythmical. Eating when exhausted is a deplorable habit, yet the most copious meal of the day is eaten when the body is exhausted after the labor of the day. Someone has said that "a tired stomach is a weak stomach." When the stomach feels weak, or, as we say, "faint," it indicates that the stomach needs rest and must not be put to the laborious work of digesting. We have already referred to the pernicious habit of exercising before and after eating. An experiment was undertaken by feeding a dog with his usual allowance of meat and then taking him out upon a fox

hunt for several hours; when killed, the meat in the animal's stomach was found in the same condition in which it had entered the organ, whereas, with another dog, fed on the same food and left home at rest, digestion was found to be complete. If food is really needed when exhausted, only a small and easily digested quantity should be ingested.

*Predigested foods* will deprive the stomach of its necessary exercise. Baron Liebig observed, "Nature refuses to be made the handmaid of chemistry."

*The Further Treatment of Self-Poisoning.*—The conventional treatment of this affection embraces methods which are merely temporary in their action. I refer specially to evacuation of the gastro-intestinal canal and neutralization of the gastro-intestinal poisons. Some contend that intestinal antiseptics is impossible: 1. Because an antiseptic strong enough to destroy germs is equally destructive to the intestinal mucous membrane. 2. Germicides destroy the innocent germs which are concerned in digestion. 3. Germicides are rapidly absorbed or are made chemically inert. Others contend that even though germicides will not destroy all the intestinal germs, they nevertheless inhibit their growth and prevent the formation of toxins. In my experience intestinal aseptization is purely a theoretic conception which is rarely realized in practice. Intestinal auto-intoxication is more often a result of the development of toxic bodies from abnormal digestion and perhaps quite independent of the action of saprophytic bacteria resident in the alimentary canal.

Gastro-intestinal poisoning, as I view it, is in the majority of instances not an acute but a chronic condition. Discretion in diet while very essential in treatment is by no means always radical. We must pay due regard to abdominal venous congestion by methods referred to elsewhere.\* Unless the latter condition is corrected by abdominal and respiratory exercises, the results of treatment can never be permanent. It is true that self-poisoning of intestinal origin may occur even in the absence of venous congestion, yet in my experience the latter is practically a constant condition.

In dealing with the sinusoidal current in the next chapter, we possess a method of treatment practically specific in action in self-poisoning without perhaps any other aid than discretion in eating.

*Evacuation of the Gastro-Intestinal Canal.*—When dilatation or atony of the stomach is present, daily washing of that organ by means of the stomach tube is almost unavoidable unless the sinusoidal current be employed after the manner soon to be described. *Purgation* is the usual method of treating intestinal self-poisoning. My experience with this method has not by any means been satisfactory. If the primary and fundamental condition of abdominal venous congestion is present, purgatives seem only to intensify self-poisoning inasmuch as by their action an increased supply of blood is sent to the abdominal organs, which still further augments congestion. Again,

\* "The Blues (Splanchnic Neurasthenia)." E. B. Treat & Co., New York, 1904. \$1.50.



the removal of intestinal epithelium and mucus by purgation which practically act as barriers against the absorption of the poisons is certainly unfavorable. We have discarded the swab in infectious throat affections for the reason that it mechanically injures the membrane of the throat and thus opens up new portals of infection. In this sense the purgative is practically an *intestinal swab*. It not infrequently occurs that purgation will intensify auto-poisoning. This result is not dependent wholly on the creation of new portals of entry for the poisons, but on concentration of the poisons which have already been absorbed into the blood. Retarded bowel action, as Strassburger<sup>100</sup> has shown, rather indicates diminished decomposition products which normally stimulate intestinal action. The fæces, it must be recalled, only eliminate from 5 to 9 per cent. of our excretions, as against 46 per cent. by the kidneys; although it has been shown that urea is normally found in the intestinal juice in small quantities and that the intestine is in part an organ of excretion supplementary to the kidney.<sup>84</sup> If purgatives must be used, then only those of the saline class, especially *sodium phosphate*, are indicated. *Drastics* must never be used. Aloes, colocynth, and cascara are not so useful as the saline purgatives, as the action of the former is limited to the lower portion of the colon, and self-poisoning as a rule arises in the small intestines. When *colonic impaction* can be recognized, and this is a matter of little difficulty, then repeated high enemata of oil and soap and water are indicated. I have seen many cases of fæcal impaction which failed

to yield to purgation and where success was only achieved by irrigation of the colon.

MacCallum<sup>87</sup> has shown that the expulsion of saline enemata, commonly observed and due to peristalsis produced by the salt, can be prevented by the addition of a small amount of *calcium chlorid* to the enema.

The double-current method of colonic irrigation suggested by Kemp has decided advantages. It permits regulation of the temperature of the solution, and straining to overcome the resistance of the sphincter can be relieved at once by checking the inflow and allowing a freer outflow. After this manner, a prolonged irrigation lasting an hour or more may be given. Such continuous irrigation permits the small intestine to evacuate its contents continuously into the lower bowel. In the absence of Kemp's instrument, the usual method by means of a colon tube may be employed. In either instance the patient lies on his side or preferably in the knee-chest position, which insures the entrance of the fluid into the colon. If an antiseptic is necessary, one may use *potassium permanganate* (10 grains to the pint), *formaldehyde* (1 minim of the 40 per cent. solution to every 2 ozs. of the irrigating fluid), or *acetozone* in 1:1,000 solution. For impacted fæces, the previous injection of hot oil is indicated. Robertson suggests *crude petroleum* as the best solvent of impacted fæces. One of the most efficient methods of *treating constipation* is by the use of injections of olive oil. The Herschell<sup>148</sup> method, which is as good as any, consists

in the injection of from 3 to 10 ounces of warm olive oil at bedtime. This is retained during the night and usually results in an evacuation after breakfast on the following day. The oil should be introduced slowly so as not to create an immediate desire to evacuate. The apparatus used by him consists of a glass funnel provided with a metal loop, by which it can be suspended at a convenient height above the bed on which the patient lies while taking or receiving the injection.

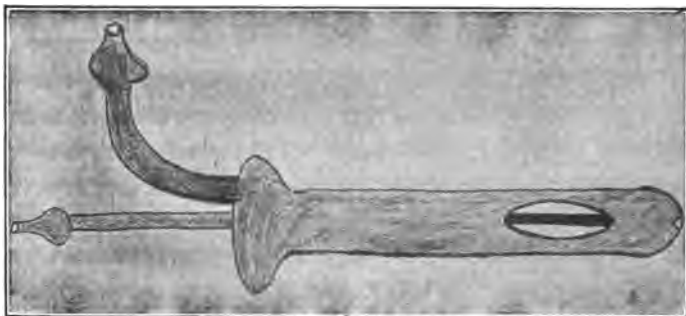


FIG. 7.—Kemp's Rectal Irrigator.

It is fitted with about 27 inches of rubber tube of large caliber and terminates in a nozzle of special construction. This nozzle has a large bore to allow the ready passage of the oil, and has the end of the bore well rounded so that even when roughly and unskillfully used it is impossible to damage the mucous membrane of the rectum, and from its shape it is self-retaining. The outflow of oil is controlled by a spring clip which is so contrived that when opened it will remain so until a catch has been released. The measured quantity of

oil is heated by standing the beaker containing it in a basin of hot water before it is injected. It is best to commence with five or six ounces and to reduce the dose daily until the smallest amount which will produce an action of the bowels is found. The effect may be then tried of using the oil on alternate nights, and so on, the intervals being lengthened gradually until the oil is no longer necessary. Most of the methods suggested for the treatment of constipation are so prolix that after trying them a little while the patient usually concludes that constipation is preferable.

*Neutralization of the Gastro-Intestinal Poisons.\*—*Calomel is empirically regarded as one of our most efficient agents for this purpose. It must be administered in small doses, followed by a mild laxative. Calomel not only acts by unloading the bowels, but by its action on the liver, one of the most important functions of which is to eliminate and destroy toxic substances. Small doses of calomel (1 grain) are more efficient than large doses to secure excessive purgation. It is quite likely that calomel eliminates the poisons in addition to its purgative action. An efficient and powerful antiseptic is *oil of cinnamon*,

\* Tissier<sup>123</sup> reports the successful employment of a bacteriotherapeutic method in intestinal infection. He found that the *Bacillus perfringens* found in the stools has a powerful fermentative action and he endeavors to arrest the proliferation of this organism by employing the antagonistic action of other bacteria. For this purpose, he used a pure culture of *Bacillus acidiparalactici*, which is given to infants as a pure culture in the dose of one or two teaspoonfuls a day.

three drops at a dose gradually increased to five drops several times a day. Caiger<sup>81</sup> has more recently recommended this oil in typhoid fever and remarks its powerful action in relieving abdominal pain, distention of the bowels and fetor of the stools. He continues its use until the temperature is normal. It may be given in capsules if there is any repugnance to the taste. Cinnamon oil in a dilution of 1 to 26,000 partially, and in the strength of 1 to 1,000 completely, inhibited the growth of the typhoid bacilli.

*Formic acid* is highly recommended by Stern in two to five drops well diluted, every hour, and its taste disguised by a few drops of glycerine. *Brewer's yeast* is recommended by the same writer, although it sometimes acts indifferently or causes meteorism. The action of yeast is supposed to be due to *zymase*, which makes the intestinal poisons innocuous. Only pure yeast should be used. The dose is 20 to 40 cc. of liquid yeast and one to two teaspoonfuls of the dried yeast. For asepticizing the alimentary canal, *acetozone* has recently come into favor as a non-toxic agent. It has been satisfactorily tested in typhoid fever, where it abolishes tympanites, fetor of the stools and varied nervous symptoms dependent on auto-intoxication. *Zinc-sulpho-carbolate* has also been indorsed for combating putrescent intestinal processes. Binkerd has recently suggested *crude petroleum*, which is neither absorbed nor assimilated, and though passing unchanged through the bowels, is regarded by him as an ideal intestinal antiseptic. *Fruit acids*, like apple and orange juice, are natural antiseptics for

the alimentary canal, and Kellogg<sup>105</sup> affirms, based on bacteriologic examinations: "There is no germ found in the stomach which can live half an hour in the juice of an acid apple or of an ordinary orange." It is perhaps for the same reason that Grawitz has recently reported cures of pernicious anæmia by means of a diet restricted to vegetables and cereals all mashed or in porridge form and lemonade taken freely. Grawitz ascribes the disease in question as a rule to poisons absorbed from the intestines.

With many of our intestinal antiseptics a chemic and physiologic action may be attained. The latter concerns itself with stimulation of the natural defenses of the organism. One of the most valuable formulas I possess for securing intestinal antisepsis is the following:

1. Sodium glycocholate .....1 grain,
2. Sulphocarbolate of zinc ....3 grains,
3. Subnitrate of bismuth .....6 grains.

I usually give double the dose of the first two ingredients and supplement the purgative action, if necessary, with three grains of cascara extract to each capsule. I use the *bismuth* in the foregoing formula after the suggestion of Croftan.<sup>113</sup> The latter is given as an indicator of the presence or absence of sulphids (sulphuretted hydrogen or its salts) from the fæces.  $H_2S$  or its alkali salts form black bismuth sulphid, and when the intestinal antiseptic is given in quantity sufficient to inhibit albumin putrefaction,

then no bismuth sulphid is formed, and the stools are not colored black. *Olive oil*, the taste of which may be disguised by mixing it in milk, increases the flow of bile, which in turn is one of the most effective intestinal antiseptics. Disinfection of the bile passages is best attained by the *salicylates*. *Copper* and its salts are especially destructive to the bacteria of the intestinal tract.

*Infusion Solutions*.—These may be used under the skin by way of the colon or the veins. The normal physiological salt solution is usually employed, and to make it non-toxic, or nearly as possible isotonic with the blood, *i. e.*, of the same molecular concentration as the liquor sanguinis, the proportion of salt in a sodium chlorid solution should be a nine-tenths per cent. solution. Experience has taught that subcutaneous infusions will wash toxic products out of the blood stream and will also dilute them. This method, according to Sahli, is effectual both as an antipyretic and diuretic and particularly useful in the intoxication peculiar to the typhoid state. Cohen suggests the use of infusion solutions by the rectum as a preventive measure against the severe symptoms of uræmia. In mental and nervous diseases of toxic origin, washing of the blood with salt solution has many warm advocates. Of all the methods, the subcutaneous method is to be preferred.

*The Elimination Treatment*.—This consists essentially of removing impurities from the body by way of the natural organs of elimination. The functions of the skin must be promoted by constant washing and

friction and by the occasional use of sweat baths. Arloing has demonstrated the toxicity of human sweat and has found sweating to be a valuable means in overcoming conditions arising from self-poisoning. Several of my patients suffering from locomotor ataxia obtain immediate relief from their pains in the legs by Turkish baths; in fact, I often employ the sweat bath as a diagnostic means for determining the toxic origin of the pain. It may be well to quote Hoelscher,<sup>91</sup> who, while admitting the increased elimination of urea, nitrogen and carbonic acid by the hot air bath, shows that in chronic constipation and indicanuria no indol nor skatol were found in the perspiration. Gans,<sup>122</sup> however, recently reports four cases of blue spots on the skin caused by indican. The functions of the kidneys are best promoted by water drinking. It is usual for the average being to say that water is only fit for washing. Drinking at meals is to be discountenanced, but it may be taken between repasts not only for the purpose of assuaging thirst, but for the purpose of removing waste matter from the body by its sluicing-like action. Water constitutes 60 per cent. of the human body, and the body cells are, as Cohen puts it, aquatic in their habit. One may abstain from eating for weeks, but a few days' deprivation of water may be fatal. In enforced abstinence from water, one of the first organs affected is the mind, because the poisons naturally formed by the tissues are not eliminated. About six glasses of water are required daily, for our solid food makes up the balance which contains an average of 50 per cent. of



water. Fruit and vegetables contain about 90 per cent., and meats about 70 per cent. of water. Water is eliminated by the kidneys, 50 per cent. ; lungs, 20 per cent. ; skin, 28 per cent., and fæces, 2 per cent. Many obstinate cases of constipation are caused by drinking too little water. In such instances, one or two glasses of water, preferably hot, may be drunk before rising. Water may be cooled, but should not be taken very cold. Water, of course, must be pure, or at least filtered. My bacteriologic investigations with the various filters in the market convince me that the Pasteur or Chamberlain filter is the best.

Leiser (*American Medicine*, Aug. 19, 1905) regards normal salt solution as the most effectual of intestinal evacuants. He directs one medium teaspoonful of table salt to be mixed in a pint of water only hot enough to drink rapidly and to be taken in the morning on an absolutely empty stomach, no food or drink to follow for half an hour. Intestinal poisoning dependent on *pancreatic disease* is often followed by marked improvement after the use of pancreatin. As the latter is destroyed by acids, it is best given coated with keratin.

*Respiratory exercises* are essential in preventing disease and maintaining the standard of health. The lungs are important organs for eliminating poisonous substances generated within the body. Without properly developed lungs no individual can be regarded as healthy. My investigations pursued for many years convince me that even in health the lungs in their entirety are rarely physiologically active. The

fault is chiefly resident in the insufficient activity of the diaphragm. (See appendix, Note 4.)

Many *nervous diseases* are being constantly cured by breathing exercises only, and the same may be said of digestive disorders. By deep breathing we constantly induce a physiologic massage of all the abdominal organs by the rhythmic descent of the diaphragm.

*Bleeding* is one of the lost therapeutic arts. Leeching is one of the good remedies out of fashion, and while formerly it was the custom to bleed too much, now we do not bleed enough. Bleeding a man into his own blood-vessels by our modern drugs, like *veratrum viride*, is an insufficient substitute. Congealed areas and high arterial tension can be only adequately relieved by the abstraction of blood. One may achieve marvelous results by bleeding in *congestive neurasthenia* and in other affections, when the face is flushed, the eyes watery, and a lightness in the head with occasional aching of a dull heavy character about the forehead or back of the head is experienced. In such instances I abstract several ounces of blood from the nose after eucainization by making several punctures of the nasal mucous membrane. It is better to avoid cocain when possible, as its use prevents free bleeding, whereas eucain causes hyperæmia of the parts. To equalize the circulation and thus hasten the elimination of poisons from congested areas, nothing is better than nitro-glycerin, and to maintain the action of the latter it is combined with atropin. It is sometimes marvelous to note the immediate effects of such vascular

dilators. Thus for many years I have employed inhalation of *nitrite of amyl* for checking *hemoptysis*, and in nearly every instance its action was almost immediate. It acts by dilating the cutaneous blood vessels and thus relieves pulmonary congestion. For the relief of portal congestion, which has such a pronounced influence in intestinal auto-intoxication, the abstraction of blood from the rectal mucous membrane after the manner already cited in bleeding the nasal mucosa, or by leeches, is indicated. *Digitalin* or *strophanthin*, alone or in combination, are invaluable for the relief of abdominal venous congestion. They are endowed with the property of constricting the splanchnic vessels alone, whereas *digitoxin* constricts all the blood vessels. Bouchard says that by the abstraction of 32 grams of blood more poisonous matter is carried off than in 100 liters of perspiration.

*Electric Light Bath.*—I have no personal experience with the use of this bath, although others speak of its beneficial action on various neuroses of toxic origin. They claim that it increases oxidation with the increase of elimination. What part the chemical rays from the light play in the exhilaration during and after the bath is difficult to say, but there certainly appears to be a difference in action between the electric and Turkish bath, with advantages in favor of the former. A very small room with many incandescent lights and a reflecting background may be sufficient for the electric bath.

*Liver Exercises.*—Modern science only confirms the traditional burdens borne by the liver. When in-

testinal putrefaction creates an overwhelming number of poisons, they invade the liver substance and are there arrested or destroyed. Many livers are incapable of thus disposing of the poisons, whereas other livers are so continuously irritated that they no longer arrest the intestinal toxins which filter into the general circulation, where they do not belong, and thus exercise their deleterious effects on the organism. A sluggish liver produces a viscid bile which in its flow toward the intestine causes many of its poisonous ingredients to be absorbed. A torpid liver furnishes an insufficient secretion of bile, and the latter being a powerful antiseptic, secretion can no longer aid in checking intestinal putrefaction. The liver in auto-intoxication is invariably sensitive. To reduce this sensitiveness and restore the hepatic functions to the normal, *massage* of the organ is indicated. The conventional liver massage is a myth, because it does not massage. In the liver exercises which I employ I have taken advantage of the physiologic fact that the flow of bile is facilitated by rythmical compression of the liver between the diaphragm and anterior abdominal wall by the act of inspiration. For the anterior abdominal wall I substitute the fingers of the patient, who leans slightly forward (Fig. 8) and presses the fingers of his curved hand as far as possible under the ribs, at the same time taking a series of deep inspirations. (See Frontispiece.) The pressure of the fingers must not be relaxed during the act of inspiration. With each expiration, the fingers can be pressed deeper and deeper. These exercises may be taken

twice daily, and, if more convenient, in the recumbent position with the legs drawn up. The crosses indicate the different liver regions where pressure is to be exerted by the fingers. I usually have my patients take twenty deep inspirations at each of the three regions.

The author's method of transmitted percussion of the liver (Chapter vi., Fig. 6) may supplement the liver massage. These two exercises faithfully executed will achieve very satisfactory results in torpidity of the liver. I can recall at least four individuals suffering from gall-stones who were cured by faithful persistence in the foregoing exercises.

*Abdominal Massage.*—The patient in the recumbent posture with knees well drawn up may successfully massage his own abdomen, employing the fingers of both hands as though he were trying to squeeze out the contents of the abdomen. The patient must massage methodically every abdominal area twice daily and each séance should last not less than ten minutes. The author has found that by this method the indican in the urine may be increased to a degree comparable to the abdominal application of the sinusoidal current.

*Abdominal Support.*—Slight grades of diminished intra-abdominal tension may exist without any notable prolapse of the abdominal organs. One method of recognizing this is by what I have called the *cardio-splanchnic phenomenon*. To elicit the latter, first percuss the lower sternal region, and it is usually found to be resonant, or even hyperresonant; next, vigorously compress the abdomen as though you wanted to squeeze out its contents. Now percuss the same re-

gion again and the percussion note will be found to be translated into a dullness which may be strictly limited in area to the right and left borders of the sternum as occurs in the norm, or the dull area may extend beyond the borders in question. The flatter the percussion sound and the more extensive the area of dullness the greater the likelihood that there is abdominal venous stasis, the result of diminished intra-abdominal tension. Such venous stasis precedes prolapse of the abdominal organs and suggests the necessity of increasing intra-abdominal tension.

More recently I have had occasion to examine a few cases of cardioptosis, dependent on diminished intra-abdominal tension without visceroptosis, and have elicited a few signs which are of some diagnostic importance. Such signs are revealed before and after increased intra-abdominal tension, and are change in the figure of precordial dullness and alterations in the character of the pulse and the blood pressure. To execute the clinical maneuver of increasing intra-abdominal pressure, an assistant stands behind the patient, who must be in the erect posture, and encircling the abdomen of the latter with his arms, makes firm pressure inwards and upwards with his hands in the region of the umbilicus. Pressure applied below the latter region is less effectual in eliciting the signs to which I will presently refer. If the area of deep cardiac dullness is first determined, it will be found to approach the normal area of dullness after intra-abdominal pressure is augmented. A pulse which is practically expressionless is decidedly altered

in character by the same maneuver. By means of the sphygmomanometer the same maneuver will increase the blood pressure from 15 to 30 mm. In executing the maneuver already cited, the patient must maintain the erect posture, so that postural influences may be excluded in the comparative clinical findings. Increased abdominal tension must likewise be maintained during the entire time that the comparative examinations are made of the heart, pulse and blood pressure. Percussion of the upper border of the liver before and after pressure is exerted on the abdomen will show a change in the area of dullness even in mild grades of diminished intra-abdominal tension.

Quincke<sup>121</sup> tests minor grades of pendulous abdomen with enteroptosis by noting the change of position of the umbilicus on coughing, when standing and when lying down. With a moderate degree of pendulous abdomen there is a rise of the umbilicus of about 1 cm. or more on coughing in the erect posture, but not when reclining. This sign is regarded as a reliable index of the amount of the relaxation. All the symptoms dependent on relaxed abdominal walls are more pronounced in the standing posture and vanish in the recumbent posture. Immediate relief is often experienced by raising the abdomen while the patient is standing.

In the *treatment* of diminished intra-abdominal tension attention must be primarily directed to strengthening the abdominal muscles and the diaphragm, with the object of increasing and maintaining intra-abdominal pressure. Such treatment

often yields phenomenal results and may be achieved by massage, faradization, hydrotherapeutic procedures and respiratory exercises. An *abdominal support* is indispensable, although it must be employed in conjunction with measures having for their object the toning of the abdominal musculature. One may objectively determine the value of the abdominal support by noting its influence on the area of heart dullness, the pulse and the blood pressure. The chief site for abdominal compression is the umbilical region, and what best answers this purpose is a soft leather belt about  $2\frac{1}{2}$  or 3 inches wide, fastened with a buckle. The latter is as efficient as it is simple and inexpensive. Other methods of abdominal support I have found both inconvenient and inefficient. It may be parenthetically observed that the relief afforded to the wearer by an abdominal support is not wholly due to reposition of the organs, as is instanced in the observations of Bial.<sup>114</sup> The latter applied transparent bandages to cases of gastropnoia and transilluminated the stomachs before and after the application of the bandages and no change in the position of the stomach could be noted.



## VIII

### THE TREATMENT OF INTESTINAL SELF-POISONING BY THE SINUSOIDAL CURRENT

DESCRIPTION OF THE CURRENT—PHYSIOLOGIC ACTION  
OF THE CURRENT—CHEMIC DEMONSTRATION OF  
THE CURRENT'S ACTION—THERAPEUTIC APPLICATION  
OF THE CURRENT—MOTOR-INSUFFICIENCY  
OF THE STOMACH

*Description of the Sinusoidal Current.\**—It is yet customary to regard the results obtained from electric treatment as dependent on psychic or suggestive action. Even Beard, who in his time was one of the leaders in electro-therapeutics, is quoted by Kellogg<sup>50</sup> as saying, "If you expect to get definite results from electrical applications, you must be sure that your patient has faith, otherwise the application will do him no good." Ten years ago in my book "The Antiseptic Club,"<sup>51</sup> I was led to make the same sinister observation. I reported that Dr. Compressor Nasi had presented the report of three hundred cases treated by him with static electricity:

#### EXPERIMENT NO. I

Cost of apparatus.....	\$25.00
Number of cases treated.....	100
Result.—Cure in every case when treatment was discontinued.	

\* See Appendix, Note 12.

## EXPERIMENT NO. 2

Cost of apparatus.....	\$1000
Number of cases treated.....	100
Result.—Cure in one hundred cases.	

## EXPERIMENT NO. 3

Cost of apparatus.....	\$1000
Number of cases treated at a blind asylum.....	100
Result.—Cure in every case when treatment was discontinued.	

In concluding his report he recommended that the remedial value of new apparatus should only, then, be positively established, after treating a definite number of blind individuals, on whom the magnificence of an apparatus could have no influence. Since then, time has modified my views. Electrotherapy is now founded on a scientific, and what is more important, a utilitarian basis. All currents do not show the same physiologic and therapeutic effects any more than do the various alkaloids derived from opium, although the same plant is the common source of all. The discovery of the *sinusoidal current* is accredited to D'Arsonval, whose communications were published<sup>52</sup> between the years 1888 and 1893. The ingenious Kellogg, however, first described the effects of this current in 1888. In my work on "Splanchnic Neurasthenia," I recommended the Kennelly apparatus as being the representative type for producing the sinusoidal current. With this apparatus, by varying the speed of the motor, the frequency of alternations and consequently of the sinusoidal waves may be varied from the lowest, 480 per second, to 1,920 per

second, the highest. At present the apparatus is now so constructed that it will obtain a frequency up to 150,000 alternations per minute. The sinusoidal current of the Kennelly machine shows an alternating symmetrical wave as shown in Fig. 9.

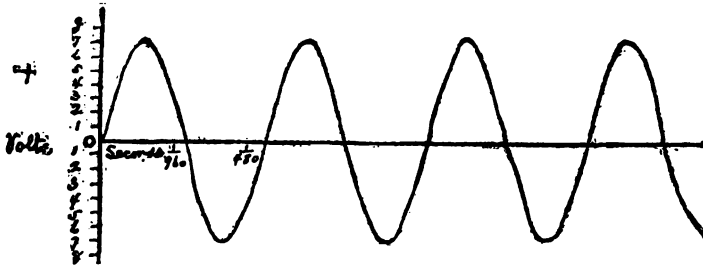


FIG. 9.—Alternating symmetrical sinusoidal wave produced by the Kennelly machine running at a frequency of 480 alternations per second (Langdon & Schenck).

The Kennelly machine is too expensive for general use, and for that reason I have had constructed for me a less expensive although equally efficient apparatus. All my clinical experiments have been conducted with the latter, an illustration of which is shown in Fig. 10.

This machine is one of the rotary type. It can be used either on the alternating or direct current. It is very portable and can be attached to any socket. The amount of voltage obtained off the patient's circuit is approximately 90 volts of very high frequency. The current is very even and shows no perceptible galvanic action. The nearer the curve of the current corresponds to the sinusoidal, the less likelihood of polar



FIG. 10.—The author's sinusoidal machine.

action and consequently electrolysis and cataphoresis. This same machine can be made with vibrator attachment, if so desired. The voltage required is from 100 to 120 volts. A governing rheostat furnished with the machine enables one to get perfect control of the current.

*Physiologic Action of the Sinusoidal Current.*—One peculiarity of this current as compared with the faradic and galvanic currents is the absence of pain when the latter are employed in sufficient strength to induce equally powerful muscular contractions. It is probable that the rapidity of alternations is so great that the sensory nerves fail to appreciate the impressions of such high frequency. The sinusoidal current may induce muscular contractions in degenerative lesions when faradism produces no response. Its penetrating power is very great and it is therefore serviceable when action on the deep-seated organs is desired. The great penetrability of this current is noted when the electrodes are applied to both temporal regions. Even though the current is barely felt, the subject experiences with the eyes closed waves of light quite unlike those experienced when the galvanic current is used. It has a specific action in hyperæsthetic conditions, whether superficial or deep-seated, and is of all currents the most available for inducing analgesic effects. While, as before remarked, the application of the sinusoidal current is relatively painless, it is a peculiarity of this electricity that a large number of muscles can be made to contract at the same time. Thus with one of the electrodes applied to the foot and the other at the

motor point in the upper thigh, all the muscles of the leg can be brought into powerful contraction. In a personal letter from Dr. J. H. Kellogg, he suggests the following method of bringing all the abdominal muscles into contraction at a point remote from the abdominal region: The patient, properly prepared, sits erect or lies in the prone posture. The electrodes are placed on either side of the spine about four inches apart and just below the inferior angles of the scapulæ. When the right point is reached, after the current is turned on, all the abdominal muscles will be thrown into vigorous contraction. Owing to the powerful action of this current on the muscles, its use is suggested in many conditions. With a current alternating five times a second, ten powerful muscular contractions can be produced each second, and 600 contractions each minute, as muscular contraction occurs with each alternation of the current. This action of the current by its percutaneous application is not merely mechanical, as Kellogg shows, and it is entirely different from passive movement. By means of a surface thermometer the temperature of the skin over the muscles of the leg brought into powerful contraction may be raised  $3.2^{\circ}$  F. in ten minutes. Such rise in temperature is due in part to the increased amount of blood flowing through the leg and to the augmented thermogenic activity of the muscles. Application of the electrodes to the abdomen after the manner presently to be recited causes the blood to be driven from the abdominal veins to the right heart. That this is really so can be determined by what I have called the *cardiosplanchnic*

*phenomenon*.<sup>54</sup> In 1892 Mall demonstrated the vaso-constrictor fibers to the portal vein in the splanchnic nerve, and further, that through their stimulation twenty-seven per cent. of the total blood could be displaced from the splanchnic area and driven forward to the right heart.

One \* of the most important properties possessed by this current by its cutaneous application alone, as I have shown elsewhere, is the powerful and demonstrable action on the internal organs. Thus with one electrode at an indifferent point, and the other over the region of the heart, this organ can be made to contract, and this contraction is dissociated with the normal contraction of that organ. (*Heart reflex of Abrams.*) If the two electrodes be applied, one on either side of the chest anteriorly, the lungs can be brought into a state of powerful contraction. (*Lung reflex of contraction of Abrams.*) (See Appendix, Note 7.)

Applied to the abdomen, the intestines, liver and spleen can be made to contract. M. Hornung (*Archives d'Electricité*) reports observations comprising 56 cases of heart disease. He employed the sinusoidal current and noted that the effect of the treatment upon the dilated heart was such that the patients became able to climb, to ride a bicycle, to row, or to take long walks. I have already shown elsewhere that these effects on a dilated heart are by no means chimerical; in fact, when the current is applied in the heart region, while the X-rays are traversing the chest, the involution of

\* See Appendix, Note 5.

the heart is at once apparent. (*Heart reflex of Abrams.*) If one electrode is placed at an indifferent point, say the back, and the other over the half-moon shaped space of Traube (*i. e.*, the tympanic area bounded by the borders of the liver, spleen and lung, in which is situated the cardiac end of the stomach), the stomach can be made to contract. (See Appendix, Note 6.) With the patient standing before the X-rays, after the stomach is moderately distended by air, and while the sinusoidal current is acting, the fundus of the stomach can be seen to recede fully an inch or more.

We have already referred, in Chapter i, to the vertebral reflexes. Now, it will be found that if one electrode from the sinusoidal current is placed over the sternum, or the sacral region, and the other over the different vertebræ (see Fig. 1), the various organ reflexes may be elicited.

To emphasize the importance of the *vertebral reflexes* in diagnosis and treatment, I may be permitted to cite the *aortic reflex*<sup>115</sup> as a paradigm. Employing the hands after the manner of executing transmitted concussion of the liver (*vide* Fig. 6), concussion of the eighth, ninth, tenth, eleventh and twelfth dorsal vertebræ will cause a dullness to appear, even in the normal subject, over the manubrium sterni corresponding to the aortic arch in this region. In healthy aortas, the dullness never extends beyond the right and left sternal lines, but in dilation and aneurism this area of dullness is extended. A patient with aneurism of the aortic arch recently seen with Dr. A. J. Sanderson,



of this city, will illustrate my meaning by reference to Fig. 11.

If concussion of the seventh cervical vertebra would reduce the size of the aneurismal sac, it seemed rational to try the vibration treatment and sinusoidal current on the seventh cervical vertebra with the result shown in c, Fig. 11. The subjective symptoms

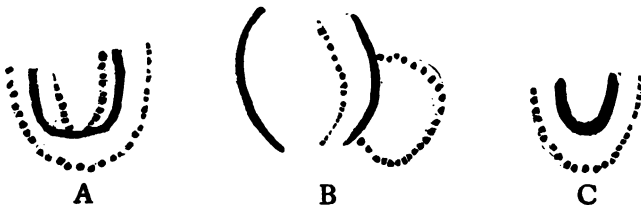


FIG. 11.—(A) Area of aneurism by percussion (dark line); area of aortic reflex of dilation (outer broken line); area of aortic reflex of contraction (inner broken line); (B) area of aneurism outlined by the X-rays, the broken lines indicating the aortic reflexes; (C) area of aneurism by percussion after two weeks' treatment.

of the patient after two weeks' treatment had practically disappeared.

*Chemical Demonstration of the Action of the Sinusoidal Current.*—No evidence is more conclusive than the following: For some time I was aware of the fact that the absorption of intestinal products could be hastened by the abdominal application of the current, but not until Dr. Fred Joyce began his work in my laboratory was this subject systematically investigated. Under my direction, he examined the

urine from the same patient before and after the abdominal application of the current. The current was as strong as the patient could tolerate without great inconvenience, and the duration of each seance was fifteen minutes. Search was first made for *indican*, a product of proteid putrefaction, because it was easily recognizable and because it served as an adequate index of intestinal putrefaction. It was found after many observations that the following conclusions could be formulated:

1. That, as a rule, even though no *indican* were present in the urine before treatment, traces could be detected in the latter fluid after the application of the current, and this increase usually continued for about four hours.

2. That if present in the urine before treatment, it was almost invariably increased after application of the current.

3. The foregoing effects were less evident with each subsequent treatment on successive days. In other words, with improvement in the intra-abdominal circulation, the intestinal toxic products were less readily formed.

4. The promotion of the excretion of *indican* is dependent on the character of the sinusoidal apparatus used; some apparatus acting more effectively than others.

My next endeavor was to determine whether putrefactive products of the intestine, *viz.*, the *ethereal sulphates*, could likewise be detected in the urine in increased quantity after abdominal application of the

current, and it was found that the precipitate of sulphates was usually double the quantity after, than before the application. It was also noted that even though indican were not increased, the sulphates were almost invariably augmented. It was found that the quantity of indican and sulphates that could be brought to absorption varied at different periods of the day, but it was usually greatest a few hours after a mixed meal.

It was furthermore demonstrated that the abdominal application of the current likewise increased the excretion in the urine of *urea*. For all practical purpose we may concede that urea is formed in the liver and that improvement in the abdominal circulation by the current merely facilitates its excretion. I found that when employing the *salol test* for determining the motility of the stomach, that salol could be detected in the urine in about half the usual time, provided that after the ingestion of the salol the abdominal application of the sinusoidal current is made at once for a duration of not less than fifteen minutes. I wish to observe parenthetically and by no means in the sense of conviction, that in two cases of *diabetes mellitus* the sugar disappeared from the urine, even after dieting was unsuccessful, and that although the former diet was resumed, no sugar reappeared. This result was attained after daily abdominal applications of the current in question, for a period in one case of 3, and in the other of 8 weeks. In both patients I was probably dealing with instances of alimentary glycosuria.

I note that Bain and others<sup>116</sup> have recently studied

the effects of baths and forms of electricity on *metabolism*. With the D'Arsonval high-frequency current there was a marked increase of urine, urea, uric acid, sulphates and phosphates and a marked diminution in acidity. *Constant current* and *sinusoidal current* immersion baths were also used. The former caused a slight increase in the excretion of urea and uric acid, whereas with the latter current no distinctive changes in the urinary constituents were observed.

*Therapeutic Application of the Sinusoidal Current in Self-Poisoning.*—The most important application of the current is to the abdomen (*abdominal application*). As no seance with the current is of any value unless continued for at least 15 minutes, I generally fix the electrodes to the anterior abdominal surface by means of a broad belt (see Fig. 12).

This enables the patient while seated to read and if necessary to regulate the strength of the current by means of the rheostat which must always be as strong as the patient can tolerate. Recalling the physiologic action of the current, we may secure the following therapeutic effects:

1. *Strengthening of the abdominal muscles.* This is an important action considering the great frequency of prolapsed abdominal viscera (*enteroptosis*) among men, and especially women. It is an infrequent event not to find displaced abdominal organs among our civilized women. Dress, faulty posture and weak abdominal muscles contribute to this end. Again, the stronger the abdominal muscles and the greater the intra-abdominal tension the less will be the quantity of

blood in the abdominal veins. It must also be noted that the application of the current to the abdomen induces vigorous contraction of the intestines, which



FIG. 12.—Method of applying the current to the abdomen. The electrodes must not touch and are placed respectively to the right and left of the navel.

fact is revealed by the dull replacing the tympanitic sound after the application. With proper abdominal muscular development the artificial expedient of em-

plying abdominal supporters will prove unnecessary. This statement applies with equal cogency to the treatment of spinal curvature dependent on weakness of the muscles of the back.

2. *The resorption of the poisonous intestinal products and excretion* by the urine will be facilitated, because the abdominal circulation is improved. The poisons thus eliminated will not burden the organs of defense, which are wholly inadequate for any length of time to destroy the poisons.

3. *Relief of intra-abdominal congestion.* The writer when he first introduced the affection known as *splanchnic neurasthenia* felt that he was treading on unknown territory and was apprehensive lest the profession would regard this as another innovation that would soon be relegated to oblivion. It is gratifying, however, for him to observe that so competent an authority as Dr. J. H. Kellogg<sup>55</sup> speaks as follows in a recent paper presented at the International Electrical Congress at St. Louis: "The application of the sinusoidal current to the abdomen alone is sufficient to produce great relief in a large class of neurasthenics who suffer from a great variety of distressing symptoms as a result of congestion of the portal system, and consequent irritation of the sympathetic centers. In the writer's opinion, the majority of neurasthenics are suffering from this cause." One may note that after application of the current to the abdomen, an enlarged liver or spleen dependent on congestion may be reduced in size. The current acts by inducing *liver* and *spleen reflexes* (Abrams). My

theory of *gas formation* so common in many neurotics is as follows: I assume that the intestines and abdominal veins represent two chambers containing a mixture of gases in unequal amount; diffusion takes place until the percentage amount of each gas in each chamber is the same. Owing to stasis of blood in the abdominal veins in many neurotics, the veins contain a larger quantity of carbonic acid, hence carbonic acid diffuses from the veins to the intestines. The intestines now becoming inflated increase intra-abdominal tension,

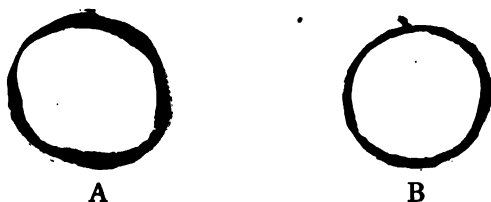


FIG. 13.—Perimeter of the abdomen (A) before and (B) after the abdominal application of the current.

which in turn squeezes the blood out of the abdominal veins to the right heart. After this manner gas accumulation in the intestines is, as I view it, distinctly a process of compensation.

In Fig. 13 one may note the difference in the perimeter of the abdomen in a neurotic subject suffering from tympanites, (A) before and (B) after the abdominal application of the current.

There are a variety of affections variously designated as biliousness, hemorrhoids, catarrh of the stomach, and many pelvic affections which owe their real origin to portal congestion and which are not only

relieved but cured by the abdominal application of the sinusoidal current. I do not wish to be regarded as an enthusiast by recommending this current as a catholicon. Nothing is further from my object. By so doing, I would discredit the value of electrotherapy, as so many have done. I attribute no more therapeutic virtue to the sinusoidal current than can be sustained by its physiologic action. In this way only can we escape speculation respecting a therapeutic method.

4. *Relief of hyperesthesia.* Apart from abdominal venous congestion, of which increased abdominal sensitiveness is so conspicuous an expression, there are many other obscure painful abdominal affections which yield to the abdominal application of the current. By yielding, I do not mean cured, but yielding as far as relief to pain is concerned. This ordinarily is of greater moment to the patient than is the diagnosis. The diagnosis of a large number of abdominal affections is still beyond the esoteric domain of the internalist and is largely a question of surgery. Speaking of the diagnosis of so frequent an affection as *abdominal arteriosclerosis*, the foremost physician in America, Professor William Osler, in a personal letter to me says: "I think the diagnosis of arteriosclerosis of the abdominal aorta must be a very difficult thing. Certainly, the most extreme grades of it may be found, which have not caused the slightest symptoms." I have endeavored to show (see Appendix, Note 8) that by aid of tracings of the abdominal aorta one may yet be able to make clear the nature of many obscure abdominal affections. In nearly every instance of self-



poisoning the *liver* will be found on palpation to be extremely sensitive. I have recently found that this sensitiveness is very easily detected, if for any reason the liver border cannot be felt, by fixing a pleximeter over any part of the liver region and striking the pleximeter a series of vigorous blows. A feeling of nausea following the percussion is almost equivalent to pain. It will be found that after the use of the sinusoidal current the sensitiveness of a liver dependent on congestion or auto-intoxication disappears at once, for a time at least. I regard this sign as an important one in differentiating the sensitiveness of congestion from other conditions.

*Relief of Congestion.*—The vasomotor nervous system supplies the muscular tissue in the walls of the blood vessels and regulates their caliber. This system so regulates the blood vessels that the amount of blood flowing through them is always in proportion to the needs of an organ. As a result of unhygienic living, defective innervation is one of the primary results, and the latter condition means congestion, and congestion means insufficient tissue respiration, and the latter means the accumulation of toxic products which are ordinarily removed by an unimpeded circulation. Tissues and organs thus bathed in pools of stagnant blood are practically in a state of asphyxia. The local asphyxia is always in proportion to the work performed by an unhealthy organ. If the organ in question be the brain, it is intoxicated by its own metabolism. We know or ought to know that neurasthenia is a *symptom*, not a disease. Thus in con-

gestive neurasthenia, when brain signs predominate, we are dealing with fatigue products acting on an already overworked brain. This is the explanation of least resistance and requires no abstruse technicalities to describe the condition. We have already shown the property possessed by the sinusoidal current in removing poisons from the intestinal canal, and what is evident in one territory becomes applicable in another. It is therefore not surprising that I should recommend the use of this current through the head for relieving the brain signs of neurasthenia. We have dignified fatigue symptoms by the phrase uric acid diathesis, when in reality we are dealing with so plebeian a condition as congestion. When we say that the joints, muscles and ligaments are favorable sites for the precipitation of uric acid, what we ought to say is that these structures are specially liable to congestion and that the fatigue signs which graduate into pains are mere expressions of localized intoxications. If it is desirable to destroy these products of localized intoxication, it is necessary to bring a greater supply of blood to these parts, for more circulating blood means more oxygen and more oxygen means better nutrition. There is no better substitute for exercise than the general application of the sinusoidal current to all the muscles of the body. Its judicious application at a 15-minutes' seance is equivalent to a walk of several miles, plus the additional fact that we are exercising muscles that are usually not brought into action. Kellogg has shown that the influence of the sinusoidal current upon metabolism may be accurately measured.

It was found that when the current was used in sufficient strength to produce general contraction of the muscles, one can produce an increase of heat production amounting to one-third. In some instances after sinusoidalizing all the muscles of the body and examining the urine for *urea* before and after treatment, I found that there was no increase in the latter; in most instances, however, the urea output was increased. Thus in one patient, after twenty minutes' treatment, the urea was increased from 1.2 per cent. before to 2.7 per cent. after treatment. Sinusoidalization of the muscles is equivalent to work, and if, as Voit and others have shown, that work does not increase the elimination of nitrogen by the urine, the increased output in my cases must be due to the removal of urea stored up in the muscles and elsewhere by an improved circulation. A method such as described might prove an excellent one for disproving or supporting the uric acid theory, for in supposed cases of uric acid poisoning the output of urea should be increased.

It will be noted by the following record that the increased excretion of urea continues for at least twenty-four hours after treatment, thus making the discrepancy in the output before and after treatment less marked on the third day.

	Before treatment.	After treatment.
First day. Urea.....	1.6%	2.1%
Second day. Urea.....	2.3%	2.6%
Third day. Urea.....	2.6%	2.7%
Fourth day. Urea.....	2.4%	2.7%

We know that *fat* is particularly absorbed in the neighborhood of muscles most actively used, hence the current is of inestimable value in removing local accumulations of fat. When it is desired to cure obesity in subjects who cannot exercise in consequence of heart weakness, the sinusoidal current is indispensable. In *neurasthenia* electrical muscular exercise is often very necessary, for the reason that the subject is incapable of doing any great amount of muscular work. Marcet<sup>56</sup> has shown that the time during which an individual can sustain a voluntary muscle contraction is determined by the endurance of the brain centers engaged in the act of volition, rather than by that of the muscles themselves. The very moment these centers are exhausted the muscle contraction gives way. Volition can be fatigued when exerted in imagination as well as in actual muscle effort.

*Motor-Insufficiency of the Stomach.*—Lack of power of the muscular wall of the stomach to discharge its contents results from many causes, notably the burden thrown upon it by indiscreet eating. The local symptoms of this condition are essentially dyspeptic, the general symptoms practically any nervous symptoms ranging from headache and dizziness to insomnia, inanition, and poisoning. For the treatment of this insufficiency the sinusoidal current is a very valuable aid applied in the manner already suggested in inducing contraction of the stomach. One electrode is fixed in the Traube area, the other at some point in the back: the longer the duration of each sitting with a strong current the better.

## IX

### THE MENTAL DYSPEPTIC AND THE INFLUENCE OF THE MIND UPON THE BODY

THE IDEOPATH—INFLUENCE OF MIND ON PHYSIOLOGIC  
FUNCTIONS—INFLUENCE OF MIND IN PRODUCING  
DISEASE—INFLUENCE OF MIND IN PRODUCING  
DEATH

*The Ideopath.*—Thought and digestion are reciprocal conditions. One influences the other. Digestion, like mentality, may be perverted. The mental dyspeptic cannot digest new ideas nor reproduce old ones without imparting to them a tinge of morbid coloring. In consequence of the primary action of the fatigue products of brain fag or the action of intestinal poisons the creation of a new idea or the rejuvenation of an old one swept into consciousness from the subconscious mind becomes a conspicuous picture which dominates the entire being of the subject. Such an individual I have already described in a previous chapter. I have called him an *ideopath*, because his apparently sole affliction is some morbid fixed idea. Very often the morbid idea persists even after the cause which brought it into existence has passed away. If self-poisoning were the ideogenic factor, its cure by no means predicates the removal of the idea, hence in a book of this kind reference must be made in the

subsequent chapter to the methods adopted for relieving the ideopath.

Dr. John Hunter affirmed that he was confident that he could fix his attention on any part of his body sufficiently long to create a sensation in that part. Professor Gates was able by thinking intently of one of his hands immersed in a basin full of water and willing that the blood should flow there, to make the water overflow. Teachers of physical culture emphasize that very little exercise, with the mind directing it, will effectually rebuild the body. Dr. Tuke claims: "There is no sensation, whether general or special, excited by agents acting upon the body from without, which cannot be excited also from within by emotional states affecting the sensory centers, such sensations being referred by the mind to the point at which the nerve terminates in the body."

*Influence of the Mind on Physiologic Functions.*—The influence of thought is instanced daily in the effects on the circulation, digestion and respiration. The suggestion of a good dinner augments the flow of saliva; fear or anxiety increases the flow of urine and attention directed to the bladder necessitates frequent evacuations of that organ. When the mind is occupied during deep attention, the respiratory movements are temporarily suspended, hence the "breathless attention" associated with intellectual work or with the receipt of unexpected news. I had occasion to prescribe a purgative and hypnotic for a patient. He was an inveterate sufferer from insomnia, and, at the time, no sleep had been obtained for three nights. At

my next visit I was informed that "he had slept splendidly," a fact which was rather surprising, when I discovered that he had, by mistake, taken the purgative as an hypnotic. I did not disabuse his mind and even now, after the lapse of fifteen years, he continues to obtain the same effect from the supposed sleeping medicine, the purgative, after each administration. A well-known chloroformist had occasion to give ether to an hysterical girl, who was about to have two small scalp tumors removed. He found that the ether bottle was empty, and while waiting for a new supply to be brought, he instructed the patient how to take deep breaths. After a few deep inspirations she cried "I am going off," and became unconscious. Both tumors were painlessly removed in this state. It was subsequently learned that the girl had taken ether once before, and the association of ideas merely recalled the former effects of the ether.

A pertinent example of *auto-suggestion* somewhat related to the foregoing is the following: One of my patients who had taken chloroform for an operation a few months before contended while giving him *amyl nitrite* to inhale, for a diagnostic object, that I was giving him chloroform, and in a minute or two he passed into a condition of narcosis, during which time he proved insusceptible to the infliction of pain.

The latter example of auto-suggestion is an interesting one, inasmuch as it demonstrates how far the mind or imagination may go in inducing a physiologic condition. The peculiar penetrating pear-like odor of *amyl nitrite* cannot be compared by any process of the

imagination with the agreeable odor of chloroform. Again, amyl nitrite is antidotal to the physiologic action of chloroform. Mind is also capable of inhibiting the sensation of feeling. In the "fire walk," a religious ceremony peculiar to certain Orientals, the celebrants walk with feet uncovered on masses of red-hot embers, or, in Tahiti, on red-hot stones. To prepare the participants for these ordeals, they are required to undergo a preparatory course of rigorous mental training. Many martyrs at the time of the Inquisition underwent the severest ordeals without physical pain, owing to the occupation of the mind with anticipated heavenly happiness, and before the use of chloroform many patients submitted to major operations, declaring afterwards that they suffered no pain.

It is an every-day observation that patients may be taught to inhibit a cough. A celebrated phthisiologist informed his patients that to cough in public was as much a breach of etiquette as to scratch one's head when it itches. At well regulated sanatoria for consumptives one rarely hears a cough.

*Influence of the Mind in Producing Disease.*—Dr. Goddard avers: "The idea of disease produces disease in direct proportion to its definiteness and in inverse proportion to the strength of the idea opposing it." Paraphrased, this law signifies that if an individual has a definite idea of a disease and its manifestations, it is more likely that he will contract that disease than any other, and conversely, if he has a vivid idea of a disease, and just in proportion as his mind



combats the idea that he will contract it, to that degree is he likely to escape. An idea "generates its actuality." Hoffman<sup>57</sup> contends that if an individual has only one idea, the latter will express itself in some kind of external motion. The brain cells concerned in idea formation will discharge their nerve force with nothing to restrain their spontaneous discharge. Man is not only an ideo-motor but an ideo-idea being. Thus with two ideas, one can inhibit the action of the other idea. The ideopath is so swayed by the mind that he acutely suffers from his imaginary ailments. Emerson portrays such a state of mind in the following quatrain:

"Some of your hurts you have cured  
And the sharpest you still have survived,  
But what torments of grief you endured  
From evils which never arrived."

A surgeon in a French hospital gave one hundred patients water for the object of experiment. Then in a state of alarm he told them he had given them an emetic in lieu of the proper medicine. The result was that four-fifths of the number became unmistakably sick. A butcher slipped in attempting to hang up a heavy piece of meat and was caught by the arm upon the hook. He was at once removed to the office of the surgeon. He said that he could not remove his coat, the sleeve must be cut off on account of the excruciating pain from which he suffered. When this was done it was discovered that the hook had passed through the clothing close to the skin, and that the latter was not even scratched. Odors, particularly of

flowers, may bring on a paroxysm of asthma, and one physician induced an attack by allowing the patient to smell an artificial rose which the patient believed was a natural one, the odor of which always induced an attack of asthma.

Students often suffer from the diseases which they are studying. Frank relates that when studying diseases of the heart he suffered from cardiac palpitation for quite a time, and he could not convince himself that he did not have an aortic aneurism. Pope's maxim, "a little knowledge is a dangerous thing," pertains in all cogency to matters medical. There is an Italian epitaph: "I was well—wished to be better—read medical books—took medicine—and died." The most dangerous dilettanteism is that of medicine. We all know that the book, "Any man his own physician," should read, "Every man his own executioner." The first rule of every work on first aid to the injured should read, "Send for the physician."

When a prominent person dies, and the details of his illness are chronicled in the daily press, I am always sure of increased patronage for several days thereafter, and the patients usually have imaginary symptoms corresponding to those of the illustrious dead. I could never before explain why diseases ran in cycles. "It is impossible," avers Gratiolet, "to be seized by a vivid idea without the whole body being placed in harmony with this idea." We are all of us susceptibly credulous and intuitively accept sense impressions as facts. Thus we may explain mental contagion: yawning is contagious and so are many

nervous habits. A certain cerebral docility, says Bernheim,<sup>58</sup> compels us to obey commands.

The influence of an idea upon the act is illustrated by holding the end of a watch chain with watch attached between the two fingers at the height of the forehead. One may note that the watch will move in various directions depending on the idea conceived of these different movements. The idea of motion suffices to produce the results independent of the fact that we exercise our will to restrain them, yet despite this fact unconscious movements are transmitted by the hand. Table-turning and other spiritualistic manifestations owe their origin to the foregoing fact.

Dr. Goddard<sup>60</sup> relates that a prominent physician was called to see a case, and that he discovered symptoms of duodenal catarrh that had been undetected by the other physicians. Anxious to help the patient, the physician lay down on a couch to read a recent work on the subject. Soon he fell asleep with his mind full of duodenal catarrh. He awoke in two hours and for several days had an intense attack of duodenal catarrh. Historical cases of stigmatization owe their origin without doubt to the same cause. St. Francis of Assisi is alleged to have caused real wounds to appear upon his own feet, hands and side corresponding to those upon the body of Jesus by constantly dwelling on the physical suffering of the Saviour.

It is questionable whether burns or wounds can be produced by suggestion, and this is also true of instances of "bloody sweat." Bernheim observed cases of bleeding from the hands and feet and sides on

Fridays at the points wounded in the crucifixion of the Saviour.

Notwithstanding close observation of the reported cases, the element of deception is extremely difficult to exclude. It is true that certain medical authorities, notably Forbes Winslow, maintain that prolonged concentrated attention on a part or organ will lead primarily to functional, to be succeeded by actual structural, disease. Thus, cancer of the stomach is alleged to have been caused by such concentrated attention, although observers will find it difficult to prove that voluntary attention directed to the part was not caused primarily by the disease in its incipency which was not sufficiently advanced to be recognized by objective means.

*Influence of the Mind in Producing Death.*—Case I. Obtaining the consent of Napoleon III., a scientist blindfolded a criminal after tying him to a table. The latter was informed that a large artery in his neck would be cut and he would bleed to death. After a slight scratch was made with a needle on the criminal's neck, a vessel containing water was allowed to discharge its contents drop by drop into a vessel beneath. After six minutes the criminal died.

Case II. Scotch students, desirous of playing a joke on an unpopular janitor, conducted him one night into a room where with solemnity he was tried and sentenced to death by decapitation. The terrified victim was then led into a corner, with his eyes blindfolded, and his head placed on a block, beside which was a sharp axe. He was then given a blow on the neck

with a wet towel, and the students were horrified to find that when they raised him he was dead.

Case III. A woman was supposed to have taken poison for suicidal purposes. At the medico-legal examination it was found that she had only taken a harmless insect powder in the belief that it was a deadly poison.

*Influence of the Mind in Curing Disease.*—Dr. John Hunter said, “As the state of mind is capable of producing a disease, another state of it may effect a cure.” When the mind is concerned in curing disease, the average skeptic refers the result to imagination, as though the matter deserved only contempt. Imagination is by no means the contemptuous process that is currently believed, for constructive imagination yields products necessary for material progress. Tyndall uttered an important truth when he contended that while philosophers may be right in asserting that we cannot transcend experience, yet gifted with the power of imagination we can lighten the darkness which surrounds the world of the senses. Someone has said the more imagination possessed by a blacksmith the better will he shoe a horse. Sir Benjamin Brodie observed that physical investigation assists us in recognizing the value of correct use of the imagination. It is a wondrous faculty, which, when uncontrolled, leads one astray into a wilderness of perplexities and error, yet when controlled by experience and reflection, it becomes the noblest attribute of man, the source of genius and the instrument of discovery of science. Couple imagination with confidence and add

faith, and your therapeutic results will nearly always have the same good effects independent of the method employed. In a recent magazine, a New York company advertises the sale of different talismans which are good for any conceivable purpose, all the way from honor and riches to love and health. No doubt these talismans achieve their object as effectually as some medicines, for their suggestive action on a susceptible mental soil is undeniable. Tuke quotes Pierre Ponponazzi, an author of the sixteenth century: "The cures attributed to the influence of certain relics are the effects of this imagination and confidence. If the bones of any skeleton were put in the place of the saint's bones, the sick would none the less experience beneficial effects, if they believed they were near veritable relics." Suggestion plays an important rôle in most of our therapeutic methods, notably in electrotherapeutics. A patient was brought to my office for severe pains in the knee-joint which failed to yield to successive methods of treatment. Before prescribing I examined her knee before the X-rays, after which she was dismissed and told to come again on the following day. She had accidentally mistaken my examination for a treatment, for when she returned she said the pains had entirely disappeared after a single treatment.

*Recapitulation.*—Eastern religions taught that matter was subservient to mind, and the history of religion adduces many instances of mental healing. Elijah healed the dead child by stretching himself upon the body and calling upon the name of the Lord.

The kings of England and France restored health by the laying on of the hands. Mental healing is best explained by acknowledging the two planes of consciousness of man, the subjective and objective minds. The objective or waking mind directs consciousness and has the power of reason, whereas the other mind, incapable of reasoning, accepts unreservedly any suggestion which it receives. The subjective mind controls most of our bodily functions and is equally controlled by the objective mind. In hypnosis, the objective mind is relegated to the background and the receptivity of the subjective mind becomes correspondingly more acute. Lured by faith and suggestion, the condition of the subjective mind even in the waking state can be made equally susceptible, and it is not unlikely that a partial hypnosis exists. When the subjective mind of the individual accepts the dictates of his objective mind, it is called *auto-suggestion* and suggests that we can all create our own individuality; for we can be what our thoughts make us, for "as he thinketh in his heart, so is he." It is wrong to assume that mental influences are strictly limited to the treatment of functional disturbances. Even in organic affections the suggestion of hope is in itself sufficient to induce the physician to make energetic efforts in diverse ways to gain the confidence of the patient's reasoning or conscious mind, so that the subjective mind may be influenced.

## X

### RELIEF FOR THE IDEOPATH

PRELIMINARY FACTS—THE PATIENT AS WELL AS HIS  
DISEASE — THE INDIVIDUAL PRESCRIBER — THE  
CHARLATAN AND THE PHYSICIAN—METHODS FOR  
ELIMINATING A MORBID IDEA—HYPNOTISM

*Preliminary Facts*—Respecting this subject, the reader must review what has been said concerning the psychology of the patient in Chapter iii. *Mental medicine* is necessary for a mental disease, but one must not forget that not only does the mind influence the body, but the latter also influences the mind. The patient is a suffering human being, not a machine in need of repairs. Any physician who neglects to approach the physical symptoms through the mind will find the practice of medicine a sorry task. The physician is often compelled to conciliate the mind of the patient while nature is effecting the cure. The primary duty of the physician is "to find out what will harm the patient, and then not give it." To succeed with the introspectionist, the physician must have been one himself, or at least to have suffered somewhat from the tortures of nerve despondency. He must be a good listener and feel deeply interested in the interminable narrative of the neurasthenic. The amount of hope and encouragement which the average patient receives from the scientific consultant recalls the



anecdote related of the celebrated Frerichs. Frerichs after having carefully examined a patient was asked by the latter about the prospects for recovery. Frerichs answered: "I haven't as yet made the diagnosis, but do not alarm yourself needlessly, for we will be able to discover everything at the autopsy." Conservative medicine is too often a practice of trusting to nature and confirming the diagnosis at the autopsy. Someone said the chief object of a consultant is to examine the rectum; he could also have added the mind. Some achieve success in making the patient believe that his sickness is of a special personal interest to them. We must not forget the Hippocratic allusion to medical art, "that it consists of three things—the patient, his malady, and the physician." The therapeutic nihilism of Skoda is no longer applicable: "We can diagnose disease, describe it, and get a grasp of it, but we dare not by any means expect to cure it." A classical education is frequently a digest of knowledge, the possessor of which thanks God that it can be of no practical use to mankind. Medical practice is more than a discovery of facts: it is the practice of intelligent sympathy, the creation of inspiration and the inoculation of hope. The average patient is not so much concerned about what he has as by what he thinks he has. "The patient is seldom right: in imaginary diseases he believes too much, in real diseases he does not believe enough." The credulous in medicine believe too much and the skeptics believe too little.

*The Patient as Well as His Disease.*—Two diagnoses are imperative, the disease and the patient.

*Medicus curat, naturas sanat morbos* (the physician cures, but nature heals). "Treat the condition, not names; the man, not the disease." "Successful treatment," said Hufeland, "requires one-third science and two-thirds *savoir-faire*." Radcliffe asserted that "as a young practitioner he possessed twenty remedies for every disease, but at the close of his career he had found twenty diseases for which he had not one remedy." "A physician is known by the prescription he writes." "It should be written with a pen of iron and with the point of a diamond." A physician has been defined as "one who spends his life in writing death sentences in Latin." Few of us can arrogate to ourselves so much erudition. Latinizing a prescription correctly is a monument to our predecessors. Voltaire said, "Doctors are people who pour drugs, of which they know little, into a body, of which they know less." Of medicine, Plato said, "An art which considers the constitution of the patient and has principles of reason and action in each case." Most physicians' conception of medical practice is to prescribe internally, externally, and eternally.

"For physic and farces,  
His equal there scarce is,  
His farces are physic  
His physic a farce is."

To select judiciously from the old drugs is equal to discovering new ones. We must dose with discretion. "For a sonnet to Amanda and the like, stewed prunes only might be sufficient, but for a great design, noth-

ing less than a more formal and more formidable dose." Some patients require vile drugs which in action are like what David Harum said about dogs: "They say a reasonable amount of fleas is good for a dog—keeps him from brooding over being a dog." With some patients "the rankest compound of villainous smell that ever offended nostril" often achieves miracles.

*The Individual Prescriber.*—He is the ideal type of the practical physician, and he fulfills the important function of prescribing for the patient. The prescription of the French physician not only embodies the medicament, but likewise dietetic rules and other methods to be followed by the patient; in other words, he gives his patients written in lieu of oral instructions. If a bath is prescribed, even the most trivial details are written. It would be wise for us to emulate this custom, for instructions to the average patient go into one ear and out of the other, for there is nothing between the ears to retain them.

Such general directions of recommending another climate without detailing the specific attributes of the climate to be sought, recalls the story of the young physician who was once called in by a gentleman who had a very sick mother-in-law. After looking into the case carefully, the young M. D. called the gentleman aside and said:

"Well, the only thing I can suggest is that you send your mother-in-law to a warmer climate."

The man disappeared, and came back with an axe a moment later, and exclaimed:

"Here, doctor, you kill her. I really haven't the heart."

The following (Fig. 14) is cited as an example of an individual prescription given by the famous English physician, Sir Andrew Clark, for a patient of mine with a *dilated colon*. To emphasize the individuality of the directions, they were in his own handwriting and details of special importance were inscribed in red ink.

We must be careful to avoid having our therapeutic methods referred to as a "meditation on death," as Asclepiades said of the Hippocratic treatise on therapeutics. "To obviate the tendency to death," as the old therapists put it, can be made the object of intelligent effort. Medicine embraces more than "a theorem of investigation by the senses," and disease can often be combated even without the aid of ultra-scientific methods, provided intelligent individual interpretation is employed.

#### MEDICAL APHORISMS.

1. The first step in treatment is to change the conditions which produced the disease.
2. Remove the cause and assist nature to repair the injury.
3. Everything that promotes the general health promotes recovery from the particular disease.
4. All that influences health, influences disease.
5. The basis of pathology is physiology: that of therapeutics is hygiene.
6. When a patient is cured, remove him from his former surroundings.
7. Prolonged chronicity is no less to be feared than a relapse.
8. The farther the physician and the patient drift from nature, the more difficult it is to cure.

# General directions for

Aug 16<sup>th</sup> May 1892  
10, CAVENTISH SQUARE.

In first waking in the morning up a glass of cold water  
in morning take a tepid spongi bath. Personal hygiene  
bathing  
dress loosely and warmly  
breakfast: whole meat bread & butter with eggs or  
peas porridge or even chicken or game and at 11 o'clock  
of each half a pint of tea, both China tea not in  
glass over fire minutes  
lunch about 12: fresh meat bread, potatoes some  
bitter, boiled green vegetables. Drink weak Tea.  
Dinner 1 1/2 to 2: fish, meat bread, potatoes  
some boiled green vegetables and much fruit, including  
cooked apple. Drink weak tea with or without  
much better without - One ounce glycerine  
in it.

In the afternoon med. soap that in some cases  
has proved up a glass of cold water.

Morning exercise, 1/2 to 1 mile

Walk at least half an hour twice daily

On a Sunday, bread, potatoes, chicken, corn, drink brandy  
and preserve portions for patients. Cheese, cream,  
ice cream, dried fruit, salad, milk, eggs, cream,  
hot tea & sparkling wines and all sweets  
in and of the best drinks -  
avoid self, notice and self distrust. Repress

the usual self consciousness of any sort - and  
keeping these rules in mind for the first three days  
then a full active and fresh nervous life

In the evening, at 7 o'clock, take a glass of cold water and a  
glass of weak tea. At 8 o'clock, take a glass of cold water and a  
glass of weak tea.

Also concurrently in the evening, the Chinese  
spices, the 50 wels, after breakfast, find  
good effects of the 50 wels for  
two days then on the third day, before bed  
time, introduce one of the 50 wels, and  
into the lower bowel and natural action  
will be very late place after breakfast

Because of losses and be content with the matter  
after each meal and as in maximum one  
to clear & cover the system

*[Signature]*

FIG. 14.—A fac-simile Prescription of Sir Andrew Clark.

9. The milder the regimen has been the greater the physician's resources.

10. The patient wishes not only to be cured, but to be treated; his luxury is in the importance of the physician and his remedies.

A. J. BORNE-VOLBER.

Science and heart must be so nicely blended in the truly great physician that neither is operative separately. Drugs have been invented for the patient and the physician: to relieve the former of obeying the laws of hygiene and the latter of inculcating them. Hope in all diseases is the most valuable adjunct of the physician. "Cheer is a powerful drug, for a merry heart, doeth good like a medicine."

*The Charlatan and the Physician.*—There is always a happy medium between the blatant effrontery of the charlatan and the ultra-conservatism of the physician. The latter does not hesitate to make gloomy prognostications, even to the patient himself, and in many instances without restriction, as though he were most careful in pursuing a conventional practice and as if his brutal frankness were in accord with science.

There are many physicians whose mannerisms in the presence of the sick fully accord with their inauspicious prognostications, and which discourage the patient and depress his spirits. To retreat from this professional dignity is regarded as a breach of etiquette. The famous English physician, Sir Edward Quain, when quite a young man was placed in temporary charge of a patient, and, full of the weight of his unaccustomed responsibility, his countenance grew longer and longer. When he was leaving one day, the lady's

husband followed him. "I greatly appreciate the anxiety you feel for my poor wife," he whispered, "but please don't let her see it again, for, after you had left the room, she asked me if you were the undertaker."

An individual who regards himself as sick is as sick as he thinks he is, and the charlatan thrives on the delusion.

The following aphorisms are extracted from the *Dietetic and Hygienic Gazette*, and from Cathell "*The Physician Himself*":

1. Practice is a field of which tact is the manure.
2. Modesty, simplicity, truthfulness!—cleansing virtues everywhere but at the bedside: there simplicity is construed as hesitation, modesty as want of confidence, truth as impoliteness.
3. Remember always to appear to do something—above all when you are doing nothing.
4. With equal, and even inferior talent, the cleanly and genteelly dressed physician has a great advantage over the untidy one.
5. The confidence man and gambler are close students of human nature, and no matter how blackened their hearts, they hide their deformity by assuming the manners and dress of gentlemen. Now, if gentility and dress can do so much for them, how much greater influence must they exert for those who are members of a lofty profession.
6. A riding doctor has advantages over the one who walks.
7. The skillful use of medicine is but one of many elements that make the unit of medical skill. Mankind must be studied as well as medicine, and in working on diseased bodies, remember that they are inhabited by minds that have warm sentiments, strong passions, and vivid imaginations which sway them powerfully both in health and disease.
8. To be successful, you should fathom each patient's mind, discover its peculiarities and conduct your efforts in harmony with its conditions.
9. Medicine is an honorable calling; resolve that it shall be no less by your embracing it. Remember that honor and duty

require you to do right, not for policy's sake, but because it is right.

10. Let hope, expectation, faith, contentment, fear, credulity, resolution, will and other psychological aids be your constant levers, for they may each at times exercise legitimate power.

11. If one is especially polished in manners and moderately well versed in medicine, his politeness will do him a great deal more good with the public than special acquaintance with histology, embryology, and other ultra-scientific acquirements.

12. Medicine is not a gloomy profession, but a bright and cheerful one. While allaying pain and relieving others in body and mind, you will fully realize the great good your profession enables you to do. The art of keeping hope and confidence alive in the bosom of a patient is a great one.

13. Avoid a funereal manner and a corresponding mode of dress, but show an earnest, anxious and gentle interest which is a very strong faith-inspiring quality.

*The Ethics of Untruth.*—The physician is often constrained to give deceptive answers for the good of the patient. It is rarely necessary to deceive the patient, but it is not always necessary to undeceive him. A lie, as a French wit said, should be kept for great occasions: It is too good a thing to be wasted. It may be necessary in chronic diseases to tell the patient the nature of his ailment to solicit his intelligent co-operation in treatment, yet one must recall what Pindar says of hope, which "more than aught else steers the capricious will of mortal man." Coleridge said, "In nerve disease he is the best physician who knows best how to inspire hope." There are those who believe that any departure from absolute truth is wrong, even though the object be the saving of the whole race, and there are those who agree with Paulsen: "There is not a physician in the world who does not give deceptive



answers to his patients, who does not excite hopes that he does not share. He does not blame himself, nor do others, for everyone does the same." Johnson observed, "You have no business with consequences; you are to tell the truth." Dock,<sup>80</sup> in his excellent contribution, commenting on the foregoing, notes a serious flaw in Johnson's logic, inasmuch as the chief interest of the physician is with the consequences, and if he thinks the patient can only gain by misinterpretation, it is just as proper for him to use it as it would be to give a medicine that in other cases might be quite improper.

*Methods for Eliminating a Morbid Idea.*—"Whether the object of your faith is real or false," said Paracelsus, "you will nevertheless obtain the same effects." In his "Anatomy of Melancholy," Burton says, "All the world knows there is no virtue in charms, but a strong conceit and opinion alone forceth a motion of the humors, spirits and blood which takes away the cause of the malady from the parts affected." Physicians have heretofore pursued the subject of *psychotherapy*, or mind healing, as mere dilettantes, thus bringing into existence pseudo mind-cures, notably Eddyism, which has been defined as "a mental accomplishment whereby an earache becomes a symphony concert, a broken finger a diamond ring, and a 'touch' an invitation to dine." The interest in the occult is dictated by the law of fashion, and it breaks out periodically in a new garb only to be cast aside when the same law declares it to be no longer fit for wear. The so-called cures of the pseudo mental healer are some-

what akin to the action of alcohol taken by those who purchase the temporary fictitious sensation of well-being at the expense of health. The rational mind-cure, like all things rational, is limited in its scope. It is only one of many methods for effecting cure. It does not undertake to do the impossible nor to supplant legitimate methods aiming at the same object. An essential element in mind-cure is to give close attention to the buried life and to solicit the patient's disclosure of it. A judicious analysis of a false idea by the physician and discussing it as though it were real establishes confidence between physician and patient. (This may be called the "*confessional cure*.") The patient never has imaginary diseases, although the imagination may create them. The judicious physician skillfully combines psychics and physics, and the unsuccessful physician is he who uses one to the exclusion of the other. Many ideopaths suffer so acutely that small doses of *opium* or *codein* are necessary before they can be made receptive to normal suggestion. *Opium* is one of our best mental anodynes, and the *bromides*, in sufficient doses, are good substitutes. When the physician is constrained to contend with mind and its vagaries, he cannot always "charm ache with air, and agony with words." Therefore we are often compelled to employ morbid thought anesthetics. The treatment of many ideopaths may be condensed in a word—TACT. If *direct suggestion* is used, it is not only what, it is also how, when, and to whom you suggest. Suggestion by the adroit produces physiologic and by the indiscreet physician, toxic effects. If

the ideopath be a real or supposed sufferer from heart disease, it is difficult for the physician to inoculate a good idea for a bad one, unless he adds cogency to his suggestion by demonstration. If he makes the patient do some forcible exercise like running up flights of stairs and then assures him that unless he had a strong heart such exercise would be impossible, he has demonstrated that actions speak louder than words. Physicians misconstrue the significance of *murmurs* and the patient suffers accordingly. In my book on "Diseases of the Heart" (page 30) I say: "No fallacy in medicine has been more carefully nourished than the belief that a cardiac murmur is always indicative of heart disease. Some of the most serious heart affections are unaccompanied by murmurs." I test the competency of the heart muscle and disregard the murmur for purposes of prognosis: and the pursual of this practice has given *mind ease* to many a cardiopath. In all heart troubles I make the prognosis as auspicious as reason will permit, but treat them as though my gravest suspicions were realized. If a patient fears he has *Bright's disease*, and there should be albumin in the urine, he must be assured that the latter is without significance if you can show him that the kidneys functionate adequately as filters. After all, this is our true criterion in prognosis and not the quantitative estimation of albumin. A patient who fears that he does not digest his food can often be convinced to the contrary by putting him on a test meal and then washing out his stomach. Again, if the trouble be nervous indigestion, and you can convince him that there is no

anomaly in the chemistry of digestion, by an examination of the stomach contents, you have accomplished a great deal in the way of treatment, for that very patient will then pursue a method of correct living to attain nerve health. In *hysterical loss of voice*, ask the patient to cough, and if the latter is louder in proportion to the voice, you will have demonstrated that one is no more attainable than the other. The use of electricity aids in enforcing the suggestion. H. W. Loeb<sup>80</sup> successfully treated many hysterical affections of the larynx by first impressing the patient with the gravity of the affection and that absolute relief will be obtained by an operation of some severity. The patient is told that he will be able to speak the word "Home" immediately after the operation. Placing the patient in a chair, the index finger of the right hand is introduced into the pharynx and the epiglottis pressed down until the patient becomes somewhat uncomfortable. After withdrawal of the finger the patient is told in a loud commanding voice to say, *home, home, home*. The patient responds as often as is necessary, until not only this but other words are pronounced. A single treatment may cause complete return of the voice.

Dr. Tanner, says Tuke, treated successfully fifty cases of hysterical aphonia by electro-magnetic treatment of the tongue, but before using treatment the patient was persuaded that *he would be cured*.

Dr. H. T. Patrick,<sup>81</sup> of Chicago, adopts the following method with the patient who says he does not sleep: He instructs him to go home and stay up all night, and

report to him the following morning. He does so, perhaps not having slept at all. He then instructs him to stay awake all day and the following night, and he usually finds he is unable to do so. When such a patient finds that he cannot absolutely stay awake for two nights in succession, he will make up his mind that he is not going to die from loss of sleep. I adopt the following method to convince patients suffering from insomnia (*fake insomnia*) that they really get more sleep than they think they do; I tell them to have at their bedside paper and pencil, and each time they are awake for more than an hour to make a mark on the paper. Either the monotony of effort in making the record or because they really get more sleep than they think they do, appears to have an excellent effect on such patients.

*Diversion.*—In adopting any of the following methods, the patient, if possible, should be placed in a new environment, under the care of a qualified nurse and physician. Hall<sup>103</sup> has recently established a practical shop for the manufacture of pottery and for the production of a variety of fabrics by means of hand weaving. This method of occupation is suggested by Hall for the neurasthenic state or for anyone who for reasons of mental and nervous hygiene might need to change his habits of life. Excellent results have been achieved.

As a means of substituting good for bad ideas, diversion is an excellent method. Pleasurable exercise creates objectivity, and the latter is the antithesis of self-consciousness. Diversion is practically an "*occu-*

*'pation cure,"* and when physical strength permits, a "work-cure." Some patients have such an exalted opinion of drugs that the occupation cure is best attained by having them take their medicine every ten minutes, or by the alternate employment of gargles, liniments, etc. It is well to remember, let us say, in the use of a liniment, not to apply it to the part affected, but at some remote point, with the object of directing the patient's mind away from the seat of his disease. If the patient has faith in physical remedies, massage and electricity are valuable aids, even though Moebius tells us that four-fifths of all electrical cures are dependent on mental influence.

The rhythm of physiologic functions permits of a maximum amount of exercise being taken in the early morning hours. *Attention* is one means of knowing whether the object pursued is interesting, for if it fails to incorporate the latter feature, it only adds to the mental burden. Yet, attention in the ideopath must be cultivated, and to those who have it not I say, "You must cultivate it; it is so much medicine necessary for your well-being." I make them paraphrase page after page of some interesting work on psychology, like "Talks on Psychology and Life's Ideals," by James, a book that inculcates the principles of healthful doctrines. It is surprising to note with what eagerness intelligent patients pursue such subjects and how rapid becomes the mental transformation.

A certain invalid gentleman amuses himself without assistance and obtains intellectual exercise as well by the following device: He reads Henry James's latest

novels and keeps a bridge marker meantime. If Mr. James has a sentence which he understands, he gives a mark to himself; if on the contrary he meets a sentence which beats him, he gives a mark to Mr. James. In this way every sentence must be analyzed, but the invalid declares it is capital exercise.

In many instances good mental sustenance is derived from religious readings. Robert Louis Stevenson said: "If your religion makes you gloomy, you may be sure it is wrong."

E. C. Savidge<sup>117</sup> advocates paying more attention to the psychical factors concerned in healing disease, among which the personality of the physician has an important place, so that one man's digitalis and calomel may be better than another's. Enhancing the alertness of the nervous system increases vitality, and in change we have an almost weighable vitality to add to our patients. Change is the basis of consciousness, and consciousness increases vitality, but monotony, after a certain point, lessens vitality. The great laws of the nervous system may be said to be (a) the law of novelty, (b) the law of monotony, (c) the law of peripheral change, (d) the law of central stability. Surface impressions release tension on deep centers. They should be changed as often as reasonable for the designed purpose of getting the vitality hidden therein. Freshness, vividness, youth, effective longevity lie here. A man is old the moment he ceases to do new things, to diminish his mobility. The study of the vital conditions tending to the prolongation of the life of the individual the author terms synthetical.

medicine, and in this the laws of the mind are most important. The following is given as an example of the application of these principles to a case of supreme nerve prostration in which drugs fail. (1) Separate the patient from the scene of his troubles as far as possible—even to the extent of new temporary sleeping and business quarters. (2) Restrict all discussion of troubles to the morning hours. Absolutely forbid reference thereto at night. (3) Occupy him with his periphery, by ordering Turkish bath, massage, shave, hair-cut, manicure, and have him arrayed in his best garb, etc. (4) Interpose someone disinterested in his sore thought between him and his conjugal or business partner. (5) Seek gentle exercise for his atrophied auxiliary faculties. All the play impulses, such as sports and games, are of this class. (6) Apply the power in the law of central stability.

*The Emotional Life.*—Emotions are often expressions of fatigue, or are fatigue-producing, and must be suppressed as a necessary condition of psychic health. Mary Lawson Neff <sup>62</sup> says: "The law that makes one kind of activity largely preclude another must be utilized in checking emotion. Work is the panacea for grief, and distraction is the balm for care." Emotion may be suppressed by education; it is too great to be wasted on ordinary occasions. The Lange-James theory refers the origin of our emotions to an organic disturbance reflexly aroused by the stimulus of the object; in other words, it is not the object, but the bodily commotion which the object excited. Thus, if the organic disturbance would be suppressed, we



should not feel fear so much as regard the situation as fearful. As James says, "One's personal self-discipline bids us pay primary attention to what we do and express and not to care too much for what we feel." Expressing one's anger in tears only accentuates the inner grief. "Refuse to express a passion and it dies," says James. Count ten before venting your anger. I heard one of my patients, who was a master of self-control, say that he thanked God that he once experienced an emotion. Pershing<sup>63</sup> speaks of his method of controlling *hysterical attacks*, which are exaggerated emotional disturbances whose motor reaction is largely in the voluntary muscles, especially those of respiration. If the patient observes the first premonition of the attack, she will note that respiration is becoming rapid, shallow and jerky. Now by sheer force of will the respirations can be made slow and regular. When the latter is accomplished, then attention must be directed to the contracted voluntary muscles which must be voluntarily relaxed and then the breathing is attended to again. Pershing says that the faithful performance of these instructions will stop any ordinary attack, especially if reassurance in adults or the promise of reward in children be skillfully combined. Fear may be overcome by education, just the same as the driver of a balky horse gradually exposes the animal to anything which causes fear. One of my neurasthenic patients who feared high buildings overcame the morbid sensation by ascending high buildings daily in an elevator.

*The Gospel of Relaxation.*—Definite muscular

- movements will arouse definite muscular sensations. One of my nurses designated the following method which I adopted in the treatment of ideopaths as, the "*laughter-cure*." Every hour the patient is instructed to smile for at least one minute and every two hours to laugh audibly for the same length of time. Not infrequently the patient treated his idea like the method as positively ridiculous, and he soon laughed himself into recovery. Oliver Wendell Holmes said: "A smile may be worth (to the doctor) 5,000 dollars a year," but it is worth a great deal more to the patient. Certain actions will arouse definite sensations and by controlling actions one can indirectly regulate the feeling. If we conduct ourselves in a cheerful manner, our feelings will be in accordance with our manner. I can always tell when one of my friends is angry, for he only whistles or sings when in this state. He tells me that music creates new thoughts which are inimical to bad ones. It is said that the Englishman takes his pleasures sadly, which is equivalent to saying he wastes no unnecessary energy. Another friend always speaks in a low tone of voice when he is angry, for then he makes the least demand on his nerve force. To conquer unpleasant emotions one must wear a cheerful air, which reacts on the feelings. In "*Power Through Repose*," by Annie Payson Call, one finds much that is useful for the person with disordered nerves. One is advised never to resist a worry, for it is many times increased by the effort to overcome it. By relaxing the muscles, and so quieting the nerves, one may

ignore the worry and it soon disappears. It may take some time to learn how to relax, but once learned, it becomes a habit. *Habit* in itself is a great economizer of nerve force. It is automatic action reducing cerebral participation to a minimum.

*Concentration.*—This is an excellent method of controlling morbid ideation. To practice this method, thought should first be directed to some part, say the little finger. According to the power of voluntary attention all sensations may be experienced ranging from a sensation of heaviness to actual pain. When perfect concentration is attained the respiratory rhythm becomes slower and slower and may even cease. Dr. Lewes observed: "To acquire the power of attention is to learn to make our mental adjustments alternate with the rhythmic movements of respiration." The mental-healers avail themselves of this psychic force of attention by directing thought away from the afflicted part. Attention is the essence of intellectual power. Strong emotion, associated with a fact, creates a more powerful impression on the mind.

*Expectant Attention.*—Lotze affirms that our apprehension of the world is one prolonged deception, and Taine asserts in his book on "Intelligence" that all perception is hallucination, although in some instances it may be shown to be true. What we perceive frequently depends on what we expect to perceive. Braid discovered that, by expectant attention, he could make patients see flames issuing from a magnet in a dark room, even though no magnet was present. Slate writers and spiritualists depend largely on expectant

attention in the consummation of their trickery. Suggestion influences perception, and attention not only exaggerates, but actually creates sensation. Pilgrim advises in using any therapeutic measure to tell the patient what will not happen rather than positive affirmation. Impress upon the patient the *nots* instead of the *wills*. Thus in using electric treatment for sciatica, say the pain will not recur so quickly or with so great intensity after as before treatment. This method is effectual in the "*pain habit*." It is true that mental-healers succeed in ridding the patient of some persistent pain. Such pain is merely memory pain, a veritable psychalgia. Queen Mary of England was most anxious to have a son by her consort Philip. She soon developed all the signs of pregnancy, and even had labor pains, but when the fictitious pains disappeared, and she was informed that no pregnancy existed, she became hysterical and Philip deserted her. The physician who hesitates is lost for two reasons: by suggesting lack of confidence to the patient and to himself. Any task is easier of attainment if the subject auto-suggests certainty of its fulfillment. An idea may so influence sensation that normal may be interpreted as abnormal sensations. I know a physician who uses only one drug in his prescriptions. He only uses drugs which have a definite physiological action. He acquaints his patients in advance respecting the sensations that will be experienced, and the patient, having experienced them, fully believes in his physician thereafter. This is somewhat in accord with the practice of Dr. Rush, who

never prescribed remedies until he had educated his patients with the confidence of certainty concerning the effects of the medicines. It was Sydenham's custom when consulted by the patient for the first time to say: "Well, I will consider your case and in a few days will order something." I knew one ideopath with whom I could do nothing, but he was nevertheless cured by a quack. The latter told him that he would give him a new drug which would enter into combination with the poisons lodged in his heart, for these poisons were creating all the heart symptoms. Furthermore, the patient could observe the removal of these poisons by examining his urine, for with their removal the latter would assume a bluish color. It is unnecessary to add that the marvelous drug was methylen blue. The latter substance evidently has a wide use. My associate, Dr. Joyce, tells me of a great reputation achieved by a certain quack who sent out a methylen blue tablet and a piece of gauze, together with directions to his victims. The tablet was to be taken, and if the urine turned blue, it was certain that the victim had kidney disease. By saturating the gauze with the urine, returning it to the latter, an examination would reveal the specific nature of the renal trouble. Schofield<sup>77</sup> speaks of the therapeutic power of a striking mantel-piece clock. He tested the value of the latter in two hundred uncomplicated cases of labor. He found that by impressing the patients with the fact, in cases where uterine contraction was irregular and slow, that a contraction would begin every five minutes by the

watch and last two minutes, that such contraction did occur, as a rule, when so predicted. As a *bowel regulator* time is an invaluable expedient. The sufferer from constipation, if directed to go to the toilet at a definite time each day, and at no other time, notwithstanding the inclination, may soon establish the habit of securing bowel relief.

*Coercive Measures.*—D'Israeli relates the story of a mad doctor of Milan who was celebrated for curing lunatics and demoniacs by immersing them in water as cold as ice. The patients in their bodily pain appeared to have forgotten their melancholy: thus by the terrors of the repetition of cold water a man appeared to have been frightened into his senses. I had read somewhere that an effective method for curing *incontinence of urine* in children was to have the latter, before retiring, stand in a tub, and from a large pitcher to pour cold water down their backs. I found this to be an excellent method so long as the little patients feared the cold water, and I therefore concluded that it was the fear that explained the action of the cold water. Adopting this method among certain nervous patients who would become hysterical with or without provocation, I found it equally effectual. As a routine measure, my method is to put the patient in cold packs as often as necessity demands. In more intractable cases I use the *cold water bath* just as we do in typhoid fever, every three hours or oftener, until the nervous paroxysms are subdued. The patients must of course be stimulated before entrance into the bath and all the other necessary pre-

cautions must be taken. I am an ardent advocate of a bath of about 95 degrees F. for thirty minutes or even longer for sedative and hypnotic purposes in nervous individuals. Lately I have seen four patients, two in consultation, who were unusually noisy and practically suffering from acute insanity. They had resisted all the usual methods of treatment. When told in a gentle though firm manner that they would have to be sent to an insane asylum unless they improved at a certain hour, they all became tractable within the time limit and three of them recovered completely. I do not know the fate of the fourth patient. Thus *fear* may prove a mental tonic by its judicious employment. The patient is a mixture of impulsions and inhibitions, and just as we inhibit an unruly heart by digitalis, so may we call forth the inhibitions of a delirious brain. Dr. Gibert<sup>78</sup> washed a boy's hands covered with warts in blue water, telling him that if in a week they had not disappeared, he would use yellow water, which the boy imagined would scald him. At the end of the week all the warts excepting two or three had vanished. In England, *mesmerism* was thus satirized.

## THE WONDER MAGNETIC ELIXIR.

Take of the chemical oil of fear, dread and terror,  
each ..... 4 ozs.  
Of the rectified spirits of imagination..... 2 pounds  
Put the ingredients into the bottle of fancy, digest, etc.

Hope and fear must be employed with discretion.  
Too much hope encourages apathy in the employment

of measures necessary for recovery. *Operative procedures*, or even their mere suggestion, have frequently resulted in cure of obstinate cases. Very often the operation itself in epilepsy seems to have a curative effect. Thus J. Williams White trephined in fifty cases of epilepsy in which nothing abnormal was found to account for the symptoms, yet twenty-five were reported as cured and eighteen as improved. Even indifferent operations at points remote from the skull effected the same results. Numerous supposed uterine diseases have been cured by abdominal section, or by the anesthetic alone, and the idea of abdominal section.

*Hypnotism*.—Space will not permit a discussion of this subject beyond saying that I prefer not to employ this method if I can help it. Hypnotism can never take the place of normal suggestion. Yet hypnotism has proved effective in some ideopaths, when other methods failed. I may also add that even though some ideopaths were brought into a state of deep hypnotism, I was unable in any way to influence their morbid thoughts. I agree with Bernheim, who says: "It is the duty of the physician to select what is useful in suggestion and to apply it for the benefit of his patients. When in the presence of sickness I think that therapeutic suggestion has a chance of success, I should consider myself to blame, as a physician, if I did not propose it to my patient, and if I did not even make a point of getting his consent to its employment." In the chapter on *fatigue* I spoke of the *predormant state*. I wish to state that I have had many



patients employ this period for auto-suggestion with much success. Thus in one ideopath, who was possessed of the idea that he had heart disease, my repeated assertions to the contrary proved ineffective. Then I told him to watch for the period just preceding sleep and to auto-suggest my repeated assertions. He did so for many nights, with the result that the idea no longer possessed him. I have just read a book by Henry Wood on "Ideal Suggestion Through Mental Photography." This writer, who impresses one as being very sincere, asks the reader to retire each day to a quiet apartment, and be alone "*in the silence.*" He must assume a restful position in an easy chair, and thoroughly relax the physical body to make the mind passive and receptive. "*Bar,*" he says, "the door of thought against the external world and shut out all physical sensation." The reader is then asked to rivet his mind on certain placards in very large type contained in the book, which read variously, such as: "Pain is friendly," "Mental healing is scientific," "I am healed," etc. He advises attention for from ten to twenty minutes at least until that time when the words fill and overflow the entire consciousness. Then the eyes are closed for twenty minutes longer, until it enters the mind's eye and permeates the whole organism. The words must be recalled into the field of mental vision during every wakeful hour of the night. This exercise is to be used daily. The foregoing is quoted merely to show the variety of mental methods adopted in the treatment of disease, and that by the automatic repetition of almost anything the subject

will eventually believe it, just like the liar who soon becomes convinced of the reality of his own prevarications. The patent-medicine advertiser understands the financial value of his almanac, which suggests an infinite variety of pains, and his repeated positive assertions about the efficacy of his medicines. After all is said, the potency of the suggestion is determined, not by the suggestion *per se*, but by the person who manipulates the suggestion. Thus the ignoramus is often able to compete with the scientific physician in so-called mind cures. The quack must be a necessary factor in our civilization, otherwise he could not exist. The physician is only allowed to think he knows it all, but the quack, ungoverned by conscience, is permitted to know he knows it all. With a fertile mental soil for humbuggery, truth can never successfully compete with untruth; hence the prestige of the mental-healer.

## APPENDIX

### NOTES

#### NOTE 1.—VASOMOTOR FACTOR IN BLOOD PRESSURE.

In the erect posture blood pressure rises owing to compensatory arteriole contraction, and this difference between recumbency and standing varies between 15 to 20 mm. according to my measurements with the Riva-Rocci instrument. In *vasomotor insufficiency* the postural variations are reversed, and this is especially true in neurasthenia, notably the angiopathic form as well as in the condition described by myself as Splanchnic Neurasthenia, when the blood shows an abnormal tendency to accumulate in the splanchnic area. The *bromides* carried to their physiological effects will cause high blood pressure to fall, if dependent on augmented tonus of the vasomotor center. When high blood pressure is suspected to be dependent on the absorption of *intestinal toxines*, the use of the abdominal application of the sinusoidal current, for at least a week will cause a marked reduction in blood pressure, otherwise the influence of the current is without pronounced effect. This is a diagnostic sign of some value. A series of blood measurements made for me by Dr. Joyce shows that the average drop in blood pressure before and after the abdominal application of the current, was not more than 5 mm. Among the remedies for reducing high blood pressure are amyl-nitrite inhalations, nitro-glycerin and sodium nitrite. The latter is less transitory in its effects. Cook,<sup>104</sup>—found that the reaction from one or two grains of sodium nitrite averages a fall of from 25 to 50 mm. Hg., coming on rapidly in from five to ten minutes on an empty stomach, and its effects may last as long as four hours. *Veratrum viride* is more permanent in its effects for vasodilation than any of the remedies mentioned.

**NOTE 2—THE ABDOMEN IN INTRA-ABDOMINAL  
VENOUS CONGESTION. CHROMO-DIAGNOSIS.**

In intra-abdominal venous congestion, the intra-abdominal pressure is usually increased. This is specially so with reference to the upper abdominal region. In the norm, the distance between the xiphoid process and the navel (*Linea xipho-umbilicalis*) equals the distance from the navel to the incisura pubica (*Linea umbilico pubica*). Now, in congestion, the *linea xipho-umbilicalis* is greater than the other line and the resistance of the upper abdomen is very much increased. Further, if the patient suffers from heart symptoms or dyspnœa dependent on increased abdominal pressure, such symptoms are intensified by pressure exerted anywhere between the xiphoid process and the navel. One may also note that when pressure with the finger is made in the latter region, the localized anemia induced in the norm cannot be elicited, but in its place a persistent dark red spot. The veins of the abdominal wall are distended and at the points of insertion of the diaphragm one may note a circular band of very small cutaneous blood vessels from which the blood is only feebly expressed by pressure.

*Chromo-Diagnosis*.:—I have coined this hyphenated word to describe a method of examination which is specially applicable in the early detection of distended veins on the abdomen or elsewhere. One may use colored glass, or better still, sheets of gelatine of various colors purchasable from any dealer in magic lanterns. The patient faces the light while the observer faces the patient. It will be found that, by looking through either magenta or red colored gelatine, the veins are brought into special prominence and that many veins not evident to the unaided eye can be detected by the colors already mentioned. Yellow gelatine will bring the movements of the diaphragm into special prominence. *Green* causes red areas in the skin to appear black, like silhouettes, while *yellow* intensifies the red color of cutaneous lesions. *Violet* intensifies the most insignificant erythematous patch. *Blue* intensifies brown spots in the skin. *Violet* causes yellow skin lesions to assume a salmon pink

color. The use of the foregoing colors refers to the effects obtained in daylight. Icteric coloration cannot be detected by gas-light, but when the violet is used, yellow is seen as dark yellow. Let a patient rest in the recumbent posture with his head nearest to the window, so that the light falls on his exposed chest from behind; the observer, standing at the side of the patient, holds in his hand a red gelatine sheet in an improvised frame in such

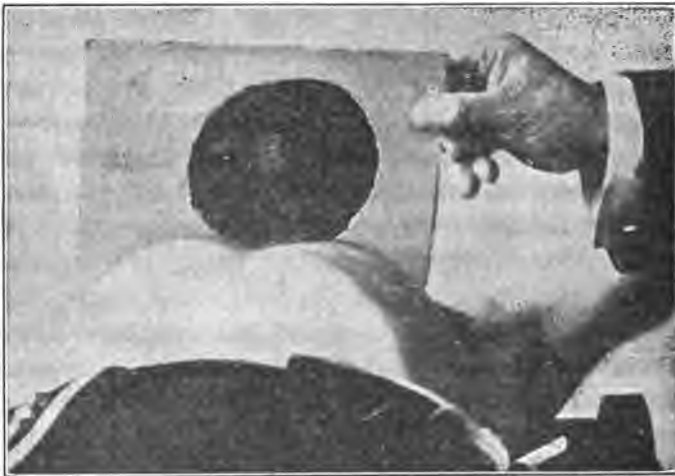


FIG. 15.—Position of patient and observer in chromo-diagnosis of the chest.

a way that the light filtering through the sheet falls on the chest. In a thin subject, especially during forced inspiration, provided the gelatine sheet is properly manipulated, the chest presents a skeletal appearance and the intercostal spaces are clearly differentiated from the ribs. In the examination of a few cases of pneumo- and hydrothorax, the foregoing differentiation is less pronounced, or absent, and for this reason chromo-diagnosis may serve as an aid in the diagnosis of the affections mentioned.

## NOTE 3.—THE TRACHEAL TRACTION TEST.

Extended reference to this subject has been made elsewhere.<sup>65</sup> When the head is thrown forcibly backward the normal resonance obtained by percussion over the manubrium and lungs contiguous thereto becomes converted into a dull or flat sound. This maneuver the writer has called the *tracheal traction test*. Since the publication of his original article, the writer has found that when the head is turned to the right or left the same phenomenon is elicited. The test is positive in health and in all cardio-pulmonary affections, but it is negative in all cases of *idiopathic asthma*.

## NOTE 4.—THE LUNG AND LIVER PHENOMENA.

*The Movements of the Diaphragm.*—The writer has shown<sup>66</sup> that the *phrenic shadow* can be seen in diffuse daylight, without resorting to the inconvenient conventional methods necessary for its elicitation. He has also shown that the shadow can be exaggerated if the skin over the area described by the excursions of the diaphragm is colored yellow by means of a saturated alcoholic solution of *gamboge*. Since his original publication, he has found, that when the patient leans far forward with arms extended, the shadow is likewise exaggerated, and that if the patient practices forced inspiration *through the mouth*, instead of through the nose, the shadow is intensified many times. Cabot, of Boston, in his text book has given us the best description of the diaphragm phenomenon. When the latter was in this city, I demonstrated to him how the shadow could be intensified by directing the patient to take deep inspirations through the mouth in lieu of the nose, and he acknowledged the superiority of this method in eliciting the phrenic shadow.

*The Lung Phenomenon.*—This, as well as the liver *phenomenon*, is here described for the first time. The lung *phenomenon* is an accessory sign of the phrenic shadow and may be seen after practice when the latter is absent. It took me three months of daily practice before I was able to distinguish the phrenic shadow. In detecting what I have called the lung

phenomenon, the patient stands facing the window, while the observer has his back to the latter. The patient is next instructed to take a deep breath through the mouth. As the diaphragm shadow descends, its lowermost limit is observed to bulge slightly in the intercostal spaces after a short interval. This interval may be as long as three seconds. The patient must suspend breathing after the forced inspiration. The bulging is most palpable in the anterior or posterior axillary line, and is caused by the descent of the lung border. Like the diaphragm shadow, it is best seen in thin persons and in those who can take a deep breath. Those desirous of studying this phenomenon had better percuss the position of the lower lung border after deep inspiration and then watch this point for the lung phenomenon. Once seen it is easily recognized and, as before remarked, it may be evident in the absence of the phrenic shadow.

*The Liver Phenomenon.*—This acquaints us with the muscular power exerted by the diaphragm. It is an X-Ray phenomenon only. If one watches the descent of the diaphragm while the patient is standing before the rays, one will note that when the tonus of the diaphragm is sufficient the liver will remain in the position caused by respiratory dislocation as long as the patient holds the breath after forced inspiration. If on the contrary, the muscle is *insufficient*, the upper border of the liver is seen to rise at once notwithstanding respiration is suspended; and the degree of ascent is proportional to the weakness of the muscle. In some individuals I have noted an ascent of fully two inches. This sign is important for gauging the muscular force of the diaphragm.

#### NOTE 5.—THE VISCERAL REFLEXES.

Like many other innovations in medicine, my reflexes have by no means been unconditionally accepted by the profession and even doubt has been cast on their existence, and I may therefore be pardoned if I cite the corroboration of other observers. In this country, Cabot, Monell and Cooper have recognized the practical value of my reflexes. At a meeting of the Société

Médicale des Hôpitaux (July 24, 1903) M.M. Pierre Merklen and Jean Heitz<sup>67</sup> read a paper on the "Reflexe Cardiaque d'Abrams," and confirmed and extended my observations. In England, Auld<sup>68</sup> refers to the practical value of the *lung reflex of Abrams* in diagnosis and treatment. His observation shows that much light was shed on the state of the lungs by testing their response, either in whole or in part, to the normal reflexes and Auld suggests that the latter should be tested as a matter of routine in the investigation of cardio-pulmonary diseases, just as the reflexes are tested in the investigation of diseases of the nervous system. In Italy, Dr. Augusto Plessi<sup>69</sup> recognizes the importance of the lung reflexes in diagnosis, as they enable us to differentiate lung dullness dependent on consolidation from that dependent on atelectasis. In eliciting the vertebral reflexes (see Fig. 1), I employ an S. S. white dental mallet weighing about four ozs., and a pleximeter of felt (Fig. 16). The two hands may substitute the mallet and pleximeter (Fig. 6).

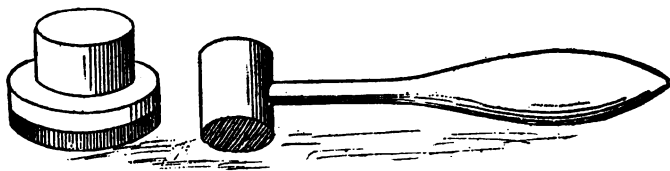


FIG. 16.—Mallet and pleximeter for evoking the concussionall vertebral reflexes, as well as the lung reflex of contraction and the stomach and intestinal reflexes.

In the absence of the latter, one may strike the spinous processes of the vertebrae with the knuckle of the second finger, although with less effective results. In either method the spinous processes to be concussed having been marked with a dermatograph, they are struck a series of sharp vigorous blows. The reaction of the viscus or viscera is of short duration, hence the objective demonstration of the visceral reflex as ascertained by percussion must be executed immediately after vertebral concussion. It may be superfluous to add that previous to the



execution of the vertebral concussional maneuver, the heart, spleen and liver must be defined by topographic percussion so that the subsequent change of the area of percussion of the organ may be recognized. The *intestines* may be brought to contraction (*intestinal reflex of contraction*) in various ways,<sup>70</sup> notably by the application of the sinusoidal current to the abdomen, and the tympanicity before the application of the current is translated into dullness after. Percussion of the epigastrium or cutaneous irritation of the skin of the abdomen restores the tympanitic sound. (*Intestinal reflex of dilatation.*)

*The Stomach Reflex of Contraction.*—To elicit this reflex, our field of observation is limited to the *Traube area*, that half-moon-shaped space which normally yields on percussion, a tympanitic sound owing to the presence of the cardiac end of the stomach. The Traube area is bounded above and laterally by the contiguous borders of the liver, lung, and spleen. Firmly fixing our pleximeter on the center of the Traube area of tympanicity, we strike the pleximeter with the mallet a series of vigorous blows and then proceed to percuss the area in question. One at once observes that this region, which formerly yielded a tympanitic sound, now presents on concussion a dull or even flat sound. The phenomenon thus obtained is the stomach reflex of contraction. It is of variable duration. The dullness replacing the tympanitic sound cannot be due to the lung reflex of contraction; if it were dependent on the latter, the fundus of the stomach would extend over a larger area, and increased tympany rather than dullness would be the result. If the lower border of the stomach is determined by percussion after the method of introducing water into the stomach through the stomach tube, and then the method of eliciting the stomach reflex of contraction in the Traube area is executed, it will be noted that the lower border of the stomach can be made to rise an inch or more. After introduction of the gastroduaphane into the stomach, the method for provoking this stomach reflex causes the stomach to contract upward and to the left.

The stomach reflex of contraction is most conspicuous when the patient is examined before the Roentgen rays. According

to this method the stomach is moderately distended by air after the conventional manner, and then percussion is executed by aid of mallet and pleximeter in the Traube area. One at once observes after administration of the vigorous percussion blows that the fundus of the stomach will recede fully an inch or more. To the gastrologist this method suggests an accurate means for gauging the motor power of the stomach.

*The Stomach Reflex of Dilatation.*—Having carefully outlined by aid of a dermatograph the tympanitic percussional area of Traube's space, rub the skin of the region vigorously, or better still, scratch the skin by means of a blunt pencil and note immediately thereafter that the area of tympanicity has become augmented. Tapping the epigastrium will often bring about the same condition of things to a greater degree. This is the stomach reflex of dilatation, which is of short duration, and rarely or never so pronounced as the counter-reflex of contraction.

#### NOTE 6.—PERCUSSION OF THE STOMACH.<sup>71</sup>

There are numerous methods suggested for determining the size, shape and position of the stomach, but unfortunately the methods that are simple are inexact and those that are relatively exact are complicated. As a rule, an accurate outline of the greater curvature of the stomach suffices in the majority of instances. We cannot attain our object by ordinary percussion, owing to the very pertinent fact that gastric tympany is not distinguishable from the percussion note of the surrounding intestine, notably the colon. The elicitation of the stomach reflex, however, will obviate the foregoing difficulty. To evoke this reflex, we must first locate the half-moon shaped space of Traube. This space yields normally on percussion a tympanitic sound, owing to the presence of the cardiac end of the stomach. Even though the tympany in this area is absent, one may nevertheless proceed to evoke the stomach reflex. Next one may fix our pleximeter in this region and strike the latter a series of vigorous percussion blows with a percussion hammer and then proceed to percuss the exposed anterior surface of the stomach,

which will now be found to yield a dull or tympanitically dull sound, and the dull area can without difficulty be distinguished from the contiguous atmosphere of tympany. The dullness of the gastric area subsequent to the concussion after the technique described constitutes what the writer has called the "stomach reflex." The duration of the reflex in question varies from one half to one and one-half minutes, it is therefore imperative to proceed with percussion for the purpose of defining the gastric area immediately after concussion is made in the Traube area. If, for any reason, the reflex is abolished before topographic percussion is completed, the reflex can again be elicited and the complete area of the stomach outlined. Percussion of the epigastrium by means of the hammer or fingers will abolish the reflex at once. If, for any reason, a pleximeter and hammer are not at our command, concussion of the Traube area may be executed with the flat surface of the fingers of the closed hand, although this maneuver will be found less effective and agreeable. If the patient leans backward as far as possible the percussion note in the gastric areas is intensified. This same method as I have shown elsewhere,<sup>119</sup> is applicable in determining the lower liver border. I have recently reported (*American Medicine*, Sept. 30, 1905), the *vagostomach reflex*. The latter represents the dullness by percussion of the lower stomach border during the time the patient forcibly extends his head back as far as possible. The head in the latter posture irritates the vagus fibers in the neck and puts the gastric musculature under increased tension, so that dullness will supplant the normal gastric tympany. Unlike the stomach reflex of contraction previously described, the vagostomach reflex does not dislocate the stomach, hence percussion of the lower border of that organ indicates its exact position.

#### NOTE 7.—THE LUNG REFLEX OF CONTRACTION.

I have already described elsewhere<sup>72</sup> one method of eliciting this reflex, which consists essentially of a lung contraction whereby the normal resonance of the lung is suddenly translated into

dullness. One may see by the method already described how the air suddenly leaves the lung when the patient is exposed to the X-rays by the rapid darkening of the lung area and the recurrence of its usual brightness after a few seconds (the time duration of the reflex). Here I will describe another method for its elicitation. With the sinusoidal current, one large electrode at an indifferent point in the back and the other a small one applied over any lung region, one may cause after a few minutes application of the current dullness to supplant resonance. If one large electrode is placed over the dorsal vertebræ and another of equal size is placed on the anterior chest, after five or more minutes' application, both lungs are brought into a condition of contraction, and the dullness, instead of being localized, as by the former method, now implicates both lungs. I can not at this time dilate on the therapeutic value of this method in the treatment of pulmonary diseases. In Figure 17 is shown the perimeter of an emphysematous chest before and after thoracic sinusoidalization.

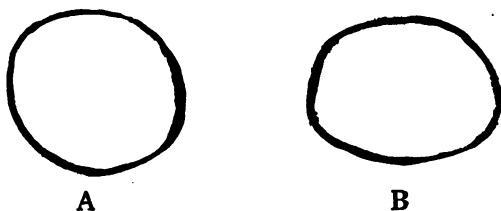


FIG. 17.—Perimeter of an emphysematous chest. (A) before, and (B) after, the application of the sinusoidal current.

#### NOTE 8.—SPHYGMOGRAPHY OF THE ABDOMINAL AORTA.

The writer has shown<sup>73</sup> that tracings of the abdominal aorta are capable of attainment, and he suggests that, by the method which he employs, it may prove of value in the diagnosis of abdominal arterio-sclerosis. *Arterio-sclerotic abdominal colic* is specially amenable, according to Buch,<sup>97</sup> to *theobromin* 1.5 to

2 gm. a day; *diuretin*, 3 to 4 gm. a day, or *tinct. strophanthi*, 5 to 8 drops three times a day. No other form of abdominal colic is thus relieved. Pain is also relieved by pressure over the abdominal aorta. The colic in question is evoked by emotion or extra exertion.

NOTE 9.—MR. HORACE FLETCHER AND HIS METHOD OF LIVING.

"The most awful bore in the world" says *The Wasp*, "is the health-crank who wants all mankind to eat just the kind of food he prefers, under penalty of all the ills from dyspepsia to apoplexy. Usually, and almost invariably, he does not understand the rudiments of the science of health-promotion."

Mr. Fletcher suffered the experience of many athletes who foolishly give up all attention to their physical condition and indulge in the unrestrained pleasures of the table. He became obese and contracted some serious chronic ailments. His condition was so bad that the life insurance companies refused to accept him at forty-five years of age as a risk. This set him to thinking and he solved the problem of health so well that at fifty-two he was in perfect physical condition, and the insurance men were glad to write a policy for him.

Talking with Professor Fenollosa, in Japan, Mr. Fletcher was told of the marvelous self-control attained by some of his Japanese friends through the practice of the Buddhist discipline. Desiring to know more of this system, he was told that it was the study of a life. "But," said the professor, "I can at least put you in the way of a start. I can tell you where to begin to grow. You must first get rid of anger and worry." Although this idea, that anger and worry were bad habits and to be got rid of, was discerned by Aristotle, it came as a startling revelation to the American. It seemed an impossibility, yet the idea haunted him, until he asked himself: "If it is possible to get rid of anger and worry, why is it necessary to have them at all?" "I felt the strength of the argument," he says, "and at once accepted the reasoning. The baby had discovered that it could walk. I would scorn to creep any longer. From the instant I realized

that these cancer spots of worry and anger were removable, they left me. With the discovery of their weakness they were exorcised. From that time life has had an entirely changed aspect."

"Anger and worry are the most unprofitable conditions known, and steal precious time and energy from life. Anger is often the result of misunderstanding, and in most cases worry prophecies never come true, or, if they do, the fulfillment is generally caused by the worry itself."

Mr. Fletcher does not rely, however, on mere mental exertion to improve his bodily condition. He is as practical as Oliver Cromwell, who exhorted his Roundhead troopers to "trust in God" but also to be sure to keep their powder dry. While warding off anger and worry Mr. Fletcher also eats sparingly. According to Mr. Fletcher, there are two kinds of hunger—"habit hunger" and "real hunger." One might contract the habit of eating six times a day, and imagine each time the meal hour arrives that you needed food, but you would only be wrecking your health.

Mr. Fletcher has discovered that he needs no breakfast at all. He arises at 4 A. M. in summer, and at daylight in winter, and takes a light meal at noon, and a light dinner later on. Sometimes he even omits the light dinner. The late Premier Gladstone, who was active in politics at eighty, made it a rule never to swallow a mouthful of food until he had masticated it long enough to count thirty. This discipline in eating soon reduces appetite to its normal functions. The healthy appetite need not be restricted by the narrow limits prescribed by vegetarian cranks, but can be trusted with any hotel bill of fare to indicate the food needed for the body. Medical men who have looked into Mr. Fletcher's methods say that his physical improvement is due to the fact that nearly all he eats is assimilated. The lower intestines have little or nothing to do. When food is not properly assimilated by an overworked stomach, the undigested masses are reduced by what is called *bacterial digestion*. This causes putrefactive fermentation and gases, and generates poisonous products in the system that bring on a number of diseases.

Mr. Fletcher was subjected to tests at Yale University by Professor Chittenden, one of the leading chemico-physiological authorities in the world. Professor Chittenden found that Mr. Fletcher maintained remarkable fitness "on food of the nitrogen value of less than seven grains daily, whereas the text books declare that from sixteen to twenty-five grains of nitrogen are necessary to human existence." The cost of Mr. Fletcher's food was ten cents a day.

Dr. Anderson, the director of the Yale gymnasium, reports that on four separate days he "gave Mr. Fletcher (aged 54) the same kind of exercises given to the 'Varsity crew. These are drastic and fatiguing, and cannot be done by beginners without soreness and pain resulting. The exercises he was asked to take were of a character to tax the heart and lungs, as well as to try the muscles of the limbs and trunk. "I should not," Dr. Anderson adds, "give these exercises to freshmen on account of their severity." The United States military authorities some time ago became so much impressed by Mr. Fletcher's demonstration of ability to do remarkable things on such slender diet that they took his theories up seriously, with a view of revolutionizing the feeding of troops. Since the Japanese soldiers showed their wonderful endurance in the present campaign on the most sparing of all diets, dry rice and dried fish, the Fletcher fad has obtained greater favor than ever in military headquarters.

#### NOTE 10.—QUANTITATIVE DETERMINATION OF INDICAN.

*Method of Strauss:* <sup>101</sup> Mix 20 c.c. of urine with 5 c.c. of a 20% solution of acetate of lead; 10 c.c. of the filtrate (equal to 8 c.c. of urine) are placed in a separating funnel which is closed below by a glass stopcock and above with a glass stopper; it is graduated to 5, 10, 15, 20 and 25 c.c. To 10 c.c. of the filtrate add 10 c.c. of Obermayer's reagent (concentrated hydrochloric acid containing 2 grams of perchlorid of iron per liter) and 5 c.c. of chloroform; shake tube gently several times, then allow to stand for some time and shake again. The chloroform

solution is then drawn off, more chloroform placed in the separating funnel and the process repeated until the chloroform extracts no more color. After this, 2 c.c. of the combined chloroform extracts are placed in a test tube of the same size and form as the test tube containing a control solution of *indigotin* in chloroform (1 mgr. in 1000 c.cm.). The colored chloroform solution is diluted with pure chloroform until the color is the same as that of the control solution. The quantity of indican present is easily calculated. If  $X$  is the amount of chloroform in cubic centimeters used for extraction and  $Y$  the amount used for dilution, then  $\frac{1}{2}XY$  would give the chloroform value, from which the amount of indigo can be calculated, remembering that the test solution contains 0.001 gm. of chemically pure indigotin in 1000 c.cm. and that 8 c.cm. of the urine was used for the reaction. The control test tube of the standard solution should be kept in a dark place. Bouma<sup>102</sup> employs a similar method with what he calls an *indicanurometer*.

#### NOTE II.—THE CHEMISTRY OF SOCIAL DISEASES.\*

In previous pages I have already shown how heterogenetic poisons like alcohol, opium, etc., influence the psychology of the individual. The autogenetic poisons derived from faulty metabolism superinduced by defective action of the excretory glands, insufficient respiratory activity and improper food, exert a similar action. *Surgical shock*, following operations, as Lydston has already shown, is really a metabolic toxemia and has been confused with wound infection. Self-poisoning conduces to nerve-degeneracy or disease which produces instability of will and perversion of the moral sense; hence self-poisoning is related to vice and crime.

Of all diseases *syphilis* is typical as illustrative of an affection which produces poisons and thus leads to general paresis and locomotor ataxia. In the Ohio State Penitentiary 70 per cent. of the convicts have syphilis. In epilepsy occurring among

\* Much of the material in this note has been excerpted from the recent classical work of Dr. G. Frank Lydston, "The Diseases of Society," 1904. J. B. Lippincott Co., Philadelphia,



criminals the toxic substances act upon the psychic in lieu of the motor areas. Hamilton,<sup>106</sup> speaking of epilepsy, says that we should devote more attention to the chemic origin of disease, for the time has arrived when epilepsy and other diseases of the nervous system bear a direct connection to the morbid chemic changes and toxemia both autogenous and heterogenous. The sources of toxicity of the blood from a biochemic standpoint are: food substances normal or perverted, tissue metabolism, perversion of the function of secretory organs, putrefaction and fermentations within the body and the evolution of the germs of infectious diseases. The glands throughout the body exert a profound influence on the integrity of the nervous system. Prostatic disease is frequently associated with profound disturbances of the nervous system. In kidney disease, irritability of temper, delusions and suicidal tendencies are frequent. Lydston mentions the case of a young physician who developed serious mental impairment as a result of prolonged constipation. Diseases of the liver are closely related to autotoxemia. Bouchard maintains that the biliary are six times as toxic as the urinary extractives. "*Crimes of impulse*," says Lydston, "are not unlikely to have dyspepsia as their basis in some cases." "*An attack of the blues*," he continues, "is bad enough in well balanced subjects. In degenerates or sufferers from disease it may precipitate the unstable brain into psychic suffering for which only the open door to the Great Beyond seems to offer relief." Observation on metabolism in criminals by Marr and Ottolenghi<sup>107</sup> have shown an augmented elimination of phosphoric acid, a condition likewise noted in chronic alcoholism.

#### NOTE 12.—SINUSOIDAL APPARATUS

Brief reference is here made to other apparatus for obtaining the sinusoidal current. The current in question, as is well known, is an alternating induced current and the electromotive force is so varied that its rise and fall in a positive direction are at once followed without interruption by a corresponding rise and fall in the negative direction, which describes a *sine curve* (Fig. 6).

Dr. J. H. Kellogg uses a common magneto-generator, wound for about fifty volts, at 3000 revolutions, as a source of sinusoidal currents. A truer sinusoidal current can be obtained from the magneto-generator by properly shaping the pole pieces and armature. Dr. Kellogg has done this, and has replaced the permanent magnet with a separately excited electromagnet which allows of a variation of the electromotive force generated without varying the speed of the armature. The generator can be obtained from any telephone supply house. The current can be controlled by an ordinary graphite rheostat. A small electric or water-motor may be used as the motive power. For complete control and regulation a friction brake must be connected with the generator.

*Street Current.*—The different alternating street currents are frequently used to get sinusoidal effects. The street currents used in San Francisco are 60 to 123 cycles. That is equivalent to 7,200 and 16,000 alternations respectively. Some cities have higher frequency, while others have a lower frequency. In using the alternating street current, a graphite rheostat in connection with a lamp for resistance is what is generally used.

## BIBLIOGRAPHY

1. Secchi.—*The Unity of the Physical Forces.*
2. Helmholtz.—*Popular Scientific Lectures*, First Series.
3. Mosso.—*Fatigue*, 1904.
4. Ibid., page 65.
5. O'Brien.—*Journal American Medical Association*, March 7, 1903.
6. Abrams.—*American Medicine*, July 16, 1904.
7. Abrams.—*Transactions of the Antiseptic Club*, 1895.
8. James.—*Principles of Psychology.*
9. Maudsley.—*Mind and Body.*
10. Schofield.—*The Force of Mind*, 1903.
11. Jastrow.—*Fact and Fable in Psychology*, 1900.
12. Ellis.—*Studies in the Psychology of Sex*, 1904.
13. Adami.—*Journal of the American Medical Association*, June 18, 1904.
14. Haller.—*Elementa Physiologiæ corporis humani*, Tom. 5, page 582.
15. Gley.—*Société de Biologie*, April 26, 1894.
16. Mosso.—*Fatigue*, 1904, page 224.
17. Gould and Pyle.—*Anomalies and Curiosities of Medicine.*
18. Dana.—*Paper before The Boston Neurological Society.*
19. Norbury.—*Medicine*, August, 1904.
20. Savill.—*Clinical Lectures on Neurasthenia.*
21. Darwin.—*The Expressions of the Emotions in Man and Animals.*
22. Gates.—*The Art of Mind Building.*
23. Combe.—*The Management of Infancy.*
24. Carpenter.—*Mental Physiology.*
25. Abrams.—*American Medicine*, May 28, 1904.
26. Partridge.—*Pedagogical Seminary*, April, 1897.
27. Melinand.—*Revue des Deux Mondes*, October 1, 1893.

28. Björnström.—*Hypnotism: Its History and Present Development*.
29. Abrams.—*Transactions of the California State Medical Society*, 1900.
30. Abrams.—*American Medicine*, July 16, 1904.
31. Thorne.—*British Medical Journal*, 1896, page 1238.
32. Hoffman.—*Psychology and Common Life*, 1903.
33. Drummond.—*Ascent of Man*.
34. Ribot.—*Psychologie des Sentiments*, page 54.
35. Schofield.—*Nerves in Disorder*, 1903.
36. Abrams.—*Sacramento Medical Times*, September, 1888.
37. Abrams.—*Philadelphia Medical Journal*, March, 1899.
38. Crothers.—*The Medical Bulletin*, July, 1904.
39. Gibson.—*Medical Record*, November 22, 1902.
40. Starbuck.—*Psychology of Religion*.
41. James.—*The Varieties of Religious Experience*, 1904.
42. Abrams.—*Medical Record*, September 8, 1900.
43. Dexter.—*Weather Influences*, 1904.
44. Fletcher.—*The A. B.—Z. of our own Nutrition*.
45. Cohen.—*System of Physiologic Therapeutics*, vol. 6.
46. Kellogg.—*The Miracle of Life*, 1904.
47. Stern.—*Medical Standard*, September, 1904.
48. *Medical Standard*, December, 1904.
49. *Southern California Practitioner*, November, 1904.
50. Kellogg.—*Modern Medicine*, October, 1904.
51. Abrams.—*Transactions of the Antiseptic Club*, 1895.
52. d'Arsonval.—*Archives de Physiologie*, 1888 to 1893.
53. Langdon and Schenck.—*Cincinnati Lancet Clinic*, May 30, 1896.
54. Abrams.—*American Journal of the Medical Sciences*, January, 1904.
55. Kellogg.—*Modern Medicine*, November, 1904.
56. Marcet.—*British Medical Journal*, vol. 2, 1895, page 6.
57. Hoffman.—*Psychology and Common Life*.
58. Bernheim.—*Suggestive Therapeutics*.
59. Chambard.—*Etude symptomatologique sur le somnambulisme*.
60. Goddard.—*American Journal of Psychology*, April, 1899.
61. Patrick.—*Journal American Medical Association*, January 30, 1904.
62. Neff.—*Medicine*, November, 1904.

63. Pershing.—*Journal American Medical Association*, January 30, 1904.
64. Abrams.—*American Journal of the Medical Sciences*, November, 1904.
65. Abrams.—*The Medical News*, June 25, 1904.
66. Abrams.—*Medical Record*, August 8, 1903.
67. Merklen and Heitz.—*La Presse Medicale*, August 1, 1903.
68. Auld.—*Lancet*, October 17, 1903.
69. Plessi.—*Gazetta degli Ospettali e delle cliniche*.
70. Abrams.—*Medicine*, January, 1904.
71. Abrams.—*Medical Record*, September 3, 1904.
72. Abrams.—*American Medicine*, January 3, 1903.
73. Abrams.—*American Medicine*, December 10, 1904.
74. Nobécourt.—*Presse Médicale, Journal American Medical Association*, December 17, 1904.
75. *Philadelphia Medical Times*, January 23, 1879.
76. Hooker.—*Lancet*, November 12, 1904.
77. Schofield.—*The Force of Mind*, 1903, page 216.
78. Gibert.—*Medical Journal of France*, 1893.
79. Abrams.—*The Blues*, 1904. *American Journal of the Medical Sciences*, January, 1904.
80. Dock.—*Boston Medical and Surgical Journal*, June 9, 1904.
81. Caiger.—*Lancet*, November 26, 1904.
82. Loeb.—*Decennial Publications*, University of Chicago, 1902.
83. Loeb.—*American Journal of Physiology*, vol. 3, 1900, page 327.
84. MacCallum.—*University of California Publications, Physiology*, March 31, 1904.
85. Robertson.—*British Medical Journal*, October 24, 1903.
86. Loeb.—*Journal of the American Medical Association*, January 16, 1904.
87. MacCallum.—*University of California Publications*, vol. 1, Nos. 10, 13, 14.
88. Moore.—*The Journal of State Medicine*, April, 1904.
89. Brackett, Stone and Low.—*Boston Medical and Surgical Journal*, July 7, 1904.
90. Butler.—*Journal American Medical Association*, February 8, 1902.
91. Hollscher.—*New York Medical Journal*, February 13, 1904.
92. Charrin and Le Play.—*Semaine Médicale*, vol. 24, No. 47.
93. Favill.—*International Clinics*, vol. 1, 1904.

94. Weichart.—*Münchener Med. Wochen.*, November 29, 1904.
95. Brunner.—*Archiv. f. Klin. Chirurgie*, vol. 73, No. 30.
96. Ogden.—*Medical Standard*, May, 1903.
97. Buch.—*Journal American Medical Association*, December 31, 1904.
98. Strassburger.—*Zeitschrift f. Klin. Med.*, vol. 46, page 434, 1902.
99. Hamilton.—*Medical Record*, December 3, 1904.
100. Strassburger.—*Zeitschrift f. Klin. Med.*, vol. 46, page 413, 1902.
101. Strauss.—*Deutsch. Med. Wochen.*, vol. 29, page 299, 1902.
102. Bouma.—*Deutsch. Med. Wochen.*, vol. 28, page 705, 1902.
103. Hall.—*Boston Medical and Surgical Journal*, January 17, 1905.
104. Cook.—*Journal American Medical Association*, January 28, 1905.
105. Kellogg.—*Modern Medicine*, December, 1904.
106. Hamilton.—*Medical Record*, December 3, 1904.
107. Marro and Ottelenghi.—*Archivio di Psichiatria*, No. 4, 1886.
108. Corning.—*Journal American Medical Association*, May 6, 1905.
109. Mitchell.—*American Medicine*, May 27, 1905.
110. Kemp.—*Medical News*, July 8, 1905.
111. Mendelsohn.—*Verh. d. 19. Kongr. f. inn. Med.*
112. Schmidt.—*Die Functionsprüfung des Darmes mittels der Probekost*, 1904.
113. Croftan.—*Journal American Medical Association*, June 24, 1905.
114. Bial.—*Verhandl. d. Congr. f. innere Med.*, 1897, pages 521-523.
115. Abrams.—*American Medicine*, April 2, 1904.
116. Bain.—*The Lancet*, April 29, 1905.
117. Savidge.—*Medical Record*, 1905.
118. Acloque.—*Cosmos*, Paris, June 10, 1905.
119. Abrams.—*The Medical News*, February 8, 1902.
120. Fenner.—*Lancet*, July 1, 1905.
121. Quincke.—*Therapie der Gegenwart*, xliv, 1905.
122. Gans.—*Berliner Klin. Wochenschrift*, May 29, 1905.
123. Tissier.—*Annales de l'Institut, Pasteur*, Paris, xliv, 1905.

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